

**The Developmental Interplay of Parental
Stress, Parent-Child Relationship Quality,
and Child Well-Being During the
COVID-19 Pandemic**

Inaugural-Dissertation

zur Erlangung des Doktorgrades der Philosophie
der Ludwig-Maximilians-Universität

München

vorgelegt von
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München

2022

Prüfungskommission

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Tag der mündlichen Prüfung: 08.11.2022

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Abstract

The COVID-19 pandemic constitutes an unprecedented sociohistorical disruption with major impacts on child well-being and development. Especially periods of lockdowns have been argued to threaten child and family functioning. Due to the high volatility of the COVID-19 pandemic evident in quickly changing periods of rising and falling infection numbers and associated public health measures (e.g., lockdowns and relaxations), the crucial question arises how child adjustment develops over the course of the pandemic.

The present thesis investigates the developmental interplay of parental stress, the parent-child relationship quality, and child well-being during the first year of the COVID-19 pandemic in Germany. Specifically, it takes a first step in closing a number of research gaps that have gained in importance as the pandemic unfolds: How do parental stress and child adjustment longitudinally relate to each other? What role does the parent-child relationship play as a potential protective factor? What are specific effects of lockdowns on child development and what factors account for interindividual differences in children's adjustment trajectories?

Following theories on the negative impact of parental stress on child well-being (Abidin, 1992; Masarik & Conger, 2017) and theories claiming that child adjustment difficulties can result in higher caregiving demands and subsequently parental stress (Lemerise & Arsenio, 2000; Lerner, 2006; Thompson, 2000), the present work proposes a bidirectional relation between parental stress and child psychological adjustment. Based on resilience theories (Masten, 2018; Walsh, 2015), the parent-child relationship quality is conceptualized as a key protective factor for child adjustment as the pandemic drags on. Following life course theory (Elder, 1998), wave-like adjustment trajectories with periods of recovery between lockdowns and steadily declining adjustment trajectories without periods of recovery are proposed. Thus, the present thesis aims to paint a comprehensive picture of how child well-being develops during the COVID-19 pandemic as especially longitudinal empirical evidence is thin and inconclusive so far. To this end, three studies comprising four measurement points (lockdown spring 2020, relaxation period summer

2020, relaxation period fall 2020, lockdown winter 2020/21) were carried out. In each study, parents of 3- to 10-year-olds responded to an online questionnaire on the situation and adjustment of parent and child during the COVID-19 pandemic.

The first study addressed parental and child well-being and the factors potentially threatening child well-being during the first COVID-19 related lockdown in the spring of 2020 in Germany. To this end, parents ($N = 2,672$) reported on sociodemographic factors (e.g., single parenthood, siblings, changes in work environment), parental strain, and child psychological well-being and problem behavior. Results showed that the lockdown induced stress in parents and children. The most challenging aspect for children was not to be able to meet friends and family. While 7- to 10-year-olds displayed more emotional problems, 3- to 6-year-olds displayed more hyperactivity and conduct problems. Child stress, parental stress, and missing other children negatively predicted children's general life satisfaction. These results constitute correlational evidence for the negative effects of lockdowns on child psychological well-being and underscore theories on the importance of peer relations and friendships in early and middle childhood.

The second study addressed if and to what extent there are bidirectional longitudinal relations between parental strain and child well-being and if the parent-child relationship quality might buffer against negative reciprocal effects between parental strain and child well-being. To this end, we assessed parental strain, parent-child relationship quality, and child well-being and problem behaviors via parental online report during the peak of the first lockdown in the spring of 2020 ($N = 2,921$, T1) and after restrictions were loosened in the summer of 2020 ($N = 890$, T2). Results demonstrated a decrease in parental strain and child problem behaviors and an increase in child well-being from T1 to T2. Cross-lagged panel models showed that child variables at T1 predicted parental strain at T2 more strongly than the other way around with the parent-child relationship quality emerging as a protective factor. True intraindividual change models indicated that changes in parental strain emerged as predictor of changes in child well-being and problem behavior. This speaks to theories suggesting a bidirectionality between parental strain and child adjustment.

The third study investigated child adjustment trajectories across multiple lockdowns and possible factors explaining interindividual differences therein (i.e., parental stress, parent-child relationship quality). To this end, we employed a naturalistic quasi-experimental design with four measurement points (T1 - first lockdown spring 2020, $N = 1,769$; T2 - loosened restrictions summer 2020, $N = 873$; T3 - loosened restrictions fall 2020, $N = 729$; T4 - second lockdown winter 2020/21, $N = 748$). This design allowed us to more

clearly separate specific lockdown effects from general developmental trends such as age related changes. Parents reported their strain (T1-T4), the parent-child relationship quality (T1-T3), and child problem behavior and well-being (T1-T4). Results indicated that child adjustment generally followed wave-like trajectories with a period of recovery between both lockdowns. However, child family-related well-being steadily declined over the first year of the pandemic. Higher parental strain and more negative aspects in the parent-child relationship were related to a greater volatility of individual trajectories (i.e., greater recovery from T1 → T2 and greater deterioration from T3 → T4). These results speak for theories highlighting the deflection of developmental trajectories due to sociohistorical disruptions.

Taken together, the present thesis offers notable insights into the development of child well-being during the COVID-19 pandemic. Our results suggest that the bidirectional interplay of parental stress and child adjustment difficulties constitutes as crucial dynamic in child adjustment to pandemic related changes. This speaks to the importance of integrating theoretical views from developmental and family science to conceptualize bidirectional relations within family systems. In addition, the current work has important implications for theories of child development during social upheaval by suggesting that adjustment trajectories depend on the temporal dynamics of the upheaval and can vary by adjustment domain. Thus, the current thesis advances our theoretical understanding of child development during the unfolding of large-scale sociohistorical disruptions.

Zusammenfassung (Deutsch)

Die Corona-Pandemie stellt ein beispiellose soziohistorische Katastrophe mit erheblichen Auswirkungen auf das Wohlbefinden und die Entwicklung von Kindern dar. Es wurde vielfach argumentiert, dass insbesondere Lockdowns das Wohlergehen von Kindern und Familien gefährden. Aufgrund der hohen Volatilität der Corona-Pandemie, die sich in rasch abwechselnden Perioden steigender und fallender Infektionszahlen und damit einhergehender Schutzmaßnahmen (z. B. Lockdowns und Lockerungen) zeigt, stellt sich die entscheidende Frage, wie sich die kindliche Anpassung im Verlauf der Pandemie entwickelt.

Die vorliegende Dissertation untersucht das entwicklungsbedingte Zusammenspiel von elterlichem Stress, der Qualität der Eltern-Kind-Beziehung und dem kindlichen Wohlbefinden im ersten Jahr der Corona-Pandemie in Deutschland. Damit geht diese Arbeit einen ersten Schritt, um eine Reihe von Forschungslücken zu schließen, die mit dem Fortschreiten der Pandemie an Bedeutung gewonnen haben: Wie hängen elterlicher Stress und kindliche Anpassung längsschnittlich zusammen? Welche Rolle spielt die Eltern-Kind-Beziehung als potenzieller Schutzfaktor? Welche spezifischen Auswirkungen haben Lockdowns auf die kindliche Entwicklung und welche Faktoren erklären interindividuelle Unterschiede in kindlichen Anpassungsverläufen?

Aufbauend auf Theorien über die negativen Auswirkungen von elterlichem Stress auf das kindliche Wohlbefinden (Abidin, 1992; Masarik & Conger, 2017) und auf Theorien nach denen kindliche Anpassungsschwierigkeiten zu einem höheren Bedarf an elterlicher Betreuung und folglich zu elterlichem Stress führen (Lemerise & Arsenio, 2000; Lerner, 2006; Thompson, 2000), postuliert die vorliegende Arbeit eine bidirektionale Beziehung zwischen elterlichem Stress und kindlicher psychologischer Anpassung. Basierend auf Resilienztheorien (Masten, 2018; Walsh, 2015) wird die Qualität der Eltern-Kind-Beziehung als wichtiger Schutzfaktor für die kindliche Anpassung im Verlauf der Pandemie konzeptualisiert. In Anlehnung an die Lebensverlaufsperspektive (Elder, 1998) werden wellenförmige Anpassungstrajektorien mit Erholungsphasen zwischen Lockdowns und stetig abfallende Anpassungspfade ohne Erholungsphasen postuliert. Demnach zielt die

vorliegende Arbeit darauf ab, ein umfassendes Bild davon zu zeichnen, wie sich kindliches Wohlbefinden während der Corona-Pandemie entwickelt, da insbesondere längsschnittliche empirische Befunde bisher dünn und nicht eindeutig sind. Dazu wurden drei Studien mit vier Messzeitpunkten (Lockdown Frühjahr 2020, Lockerungsperiode Sommer 2020, Lockerungsperiode Herbst 2020, Lockdown Winter 2020/21) durchgeführt. In jeder Studie beantworteten Eltern von 3- bis 10-jährigen Kindern einen Online-Fragebogen über die elterliche und kindliche Situation und Anpassung während der Corona-Pandemie.

Die erste Studie befasste sich mit dem Wohlbefinden von Eltern und Kindern und potenziellen Risikofaktoren für das kindliche Wohlbefinden während des ersten Lockdowns im Frühjahr 2020 in Deutschland. Dazu berichteten Eltern ($N = 2.672$) über soziodemografische Faktoren (z. B. alleinerziehend, Geschwister, Veränderungen im Arbeitsumfeld), elterliche Belastungen und über das psychische Wohlbefinden und Problemverhalten des Kindes. Die Ergebnisse zeigten, dass der Lockdown bei Eltern und Kindern Stress auslöste. Die größte Herausforderung für Kinder war es, keine Freunde und Familie treffen zu können. Während 7- bis 10-jährige Kinder mehr emotionale Probleme zeigten, zeigten 3- bis 6-jährige Kinder mehr Hyperaktivität und Verhaltensprobleme. Kindlicher Stress, elterlicher Stress und das Vermissen anderer Kinder wirkten sich negativ auf die allgemeine Lebenszufriedenheit der Kinder aus. Diese Ergebnisse stellen korrelative Befunde für die negativen Auswirkungen von Lockdowns auf das psychische Wohlbefinden von Kindern dar und untermauern Theorien über die Bedeutung von Beziehungen zu Gleichaltrigen und Freundschaften in der frühen und mittleren Kindheit.

Die zweite Studie untersuchte, ob und inwieweit es bidirektionale, längsschnittliche Beziehungen zwischen elterlicher Belastung und kindlichem Wohlbefinden gibt und ob die Qualität der Eltern-Kind-Beziehung negative Wechselwirkungen zwischen elterlicher Belastung und kindlichem Wohlbefinden abfedern könnte. Dazu haben wir die elterliche Belastung, die Qualität der Eltern-Kind-Beziehung sowie das kindliche Wohlbefinden und Problemverhalten während des Höhepunkts des ersten Lockdowns im Frühjahr 2020 ($N = 2.921$, T1) und nach Lockerung der Schutzmaßnahmen im Sommer 2020 ($N = 890$, T2) durch elterlichen Bericht in einem Online-Fragebogen erhoben. Die Ergebnisse zeigten eine Abnahme der elterlichen Belastung und des Problemverhaltens der Kinder sowie eine Zunahme des kindlichen Wohlbefindens von T1 bis T2. Cross-lagged-panel Modelle zeigten, dass Kindervariablen zu T1 die elterliche Belastung zu T2 stärker vorhersagten als umgekehrt, wobei sich die Qualität der Eltern-Kind-Beziehung als Schutzfaktor herausstellte. True intraindividual change Modelle zeigten, dass Veränderungen in der

elterlichen Belastung Veränderungen im kindlichen Wohlbefinden und Problemverhalten prädierten. Dies spricht für Theorien, die eine Bidirektionalität zwischen elterlicher Belastung und kindlicher Anpassung nahelegen.

Die dritte Studie untersuchte kindliche Anpassungstrajektorien über mehrere Lockdowns hinweg und mögliche Faktoren, die diesbezügliche interindividuelle Unterschiede erklären (z. B. elterlicher Stress, Qualität der Eltern-Kind-Beziehung). Dazu stützten wir uns auf ein naturalistisches quasi-experimentelles Design mit vier Messzeitpunkten (T1 – erster Lockdown Frühjahr 2020, $N = 1.769$; T2 – Lockerungen Sommer 2020, $N = 873$; T3 – Lockerungen Herbst 2020, $N = 729$; T4 – zweiter Lockdown Winter 2020/21, $N = 748$). Dieses Design ermöglichte es uns, spezifische Effekte von Lockdowns klarer von allgemeinen Entwicklungstrends wie altersbedingten Veränderungen zu trennen. Eltern berichteten über ihre Belastung (T1-T4), die Qualität der Eltern-Kind-Beziehung (T1-T3) und über das kindliche Problemverhalten und Wohlbefinden (T1-T4). Die Ergebnisse zeigten, dass die Anpassung von Kindern im Allgemeinen wellenförmigen Verläufen folgte, mit einer Erholungsphase zwischen den beiden Lockdowns. Das familienbezogene Wohlbefinden von Kindern nahm jedoch im ersten Jahr der Pandemie stetig ab. Eine höhere elterliche Belastung und mehr negative Aspekte in der Eltern-Kind-Beziehung waren mit einer größeren Volatilität von individuellen Trajektorien verbunden (d. h. größere Erholung von T1 \rightarrow T2 und stärkere Verschlechterung von T3 \rightarrow T4). Diese Ergebnisse sprechen für Theorien, welche die Abweichung in Entwicklungsverläufen durch sozialgeschichtliche Brüche hervorheben.

Zusammengenommen bietet die vorliegende Dissertation interessante Einsichten in die Entwicklung des kindlichen Wohlbefindens während der Corona-Pandemie. Unsere Ergebnisse deuten darauf hin, dass das bidirektionale Zusammenspiel von elterlichem Stress und kindlichen Anpassungsschwierigkeiten eine entscheidende Dynamik der kindlichen psychologischen Anpassung an pandemiebedingte Veränderungen darstellt. Dies weist auf die Bedeutung der Integration theoretischer Ansichten aus der Entwicklungs- und Familienwissenschaft in der Konzeptualisierung bidirektionale Beziehungen innerhalb von Familiensystemen hin. Darüber hinaus hat die aktuelle Arbeit wichtige Implikationen für Theorien der kindlichen Entwicklung während soziohistorischer Umbrüche. Sie weist darauf hin, dass Anpassungstrajektorien von den zeitlichen Verläufen der Umbrüche abhängen und je nach Anpassungsbereich variieren können. Somit erweitert die vorliegende Arbeit unser theoretisches Verständnis der kindlichen Entwicklung während einschneidender soziohistorischer Umbrüche.

1 General Introduction

A crucial question of developmental science concerns the trajectories of children's psychological adjustment to environmental adversity. Throughout the first two decades of their lives, a vast number of children across the globe experience highly disruptive sociohistorical contexts (Masten & Narayan, 2012). These can take the shape of singular destructive events (e.g., natural disasters, terrorism) or extend over prolonged temporal periods sometimes even constituting overarching environmental adversities spanning entire childhoods (e.g., recessions, pandemics, wars, poverty). While some large-scale disturbances are geographically confined (e.g., Hurricane Katrina), others have multinational or global effects (e.g., Great Recession of 2008). Sociohistorical disruptions present major threats and challenges to child development regarding both, the immediate adjustment to disturbing events as well as their long-term effects (Becker-Blease et al., 2010). Thus, it is of paramount importance to address children's developmental trajectories (e.g., socio-emotional, cognitive, physical) in the context of societal turmoil and investigate attenuating and exacerbating circumstances.

There are a number of theoretical and practical reasons highlighting the necessity of developmental research on children's psychological adjustment to societal upheavals. From a theoretical perspective, large-scale disruptions offer a unique window into children's adjustment in highly stressful circumstances. This allows research on child development to expand, refine, and adapt theoretical assumptions and thereby evaluate the predictive usefulness of different theoretical frameworks concerning child psychological adjustment. From a practical perspective, research on child adjustment to adversity can inform on the differential efficacy of practical interventions on a number of levels: (1) providing public information for caregivers and professionals on how to frame the events, how to address likely needs and questions of children, and how to structure interactions; (2) serving as guidelines in designing intervention programs (e.g., Dybdahl, 2001; Yoshikawa et al., 2012); (3) informing political decisions on policies and measures aiming at furthering child and family well-being. Thus, theoretical and practical considerations point to developmental

research in contexts of large-scale disruptions as important factor to advance our theoretical understanding of child development and to guide societal responses designed to alleviate negative effects and foster resilience in children and families.

After notably progressing over the last decades (Masten & Narayan, 2012), research on child adjustment to environmental adversities faces a particular challenge in the twenty-first century. That is, the pandemic caused by the SARS-CoV-2 virus has led to an unprecedented global disruption of human social life and fueled multidisciplinary efforts to uncover the pandemic's psychosocial effects. The present thesis aims to contribute to this field of research from a developmental science perspective by investigating the development of child psychological adjustment during the COVID-19 pandemic. It thereby addresses the developmental interplay of parental stress, parent-child relationship quality, and child well-being over the first year of the COVID-19 pandemic in Germany. While research on the impact of the COVID-19 pandemic on child well-being is burgeoning, the current thesis closes important research gaps in three dimensions.

First, a host of studies have focused on unidirectional relations between parental factors (e.g., stress, mental health, job and financial situation) and child well-being (e.g., Lionetti et al., 2022; Mazza et al., 2021; Spinelli et al., 2020). However, there are theoretical reasons to assume that the developmental trajectories of parental stress and child well-being are bidirectionally related and that such a bidirectional conceptualization provides an important advance in our understanding of the effects of the COVID-19 pandemic (see Chapter 1.3).

Second, the COVID-19 pandemic has led to pronounced changes in child and family stress and well-being. It is therefore paramount to identify protective factors buffering against negative effects of the pandemic on child adjustment. From a theoretical perspective, the parent-child relationship quality could constitute one of the key resilience factors for child coping with pandemic related restrictions. However, there is no clear evidence yet on the role of the parent-child relationship quality for child adjustment trajectories. The present thesis offers novel insights to what extent the parent-child relationship could constitute a crucial protective factor for children's developing adjustment to the COVID-19 pandemic (see Chapter 1.4).

Third, a major characteristic of the COVID-19 pandemic consists in its wave-like unfolding. That is, periods of exponentially increasing numbers of infections are followed by periods of rapid decreases in infections, before the next wave follows (e.g., Fisayo & Tsukagoshi, 2021; Karako et al., 2021; Salyer et al., 2021). In many countries, such as

Germany, these waves are accompanied by governmental public health related restrictions such as lockdowns involving reductions of physical social contacts and the implementation of distance learning and home office (e.g., Lu et al., 2021; Moradian et al., 2021; Ravens-Sieberer, Kaman, Erhart, Otto, et al., 2021). Notably, this wave-like unfolding constitutes a naturalistic quasi-experimental setting for research on the psychosocial effects of the pandemic. That is, lockdowns (A) are often followed by periods of loosened restrictions (B), which are then frequently followed by the next lockdown (A). This translates into an A (lockdown) – B (relaxation) – A (lockdown) design allowing developmental research to separate specific lockdown effects from general factors affecting child well-being (e.g., age-related trends). Such naturalistic quasi-experimental designs promise unique insights into child adjustment during the pandemic as they move markedly closer to causal inferences than mere correlational designs. Surprisingly, previous work has rarely taken advantage of this naturalistically occurring quasi-experimental sequence of lockdowns and relaxations. The present thesis aims to close this research gap (1) by providing novel insights into lockdown-specific effects on child adjustment trajectories and (2) by identifying determinants of child well-being and problem behavior trajectories over the first year of the COVID-19 pandemic in Germany (see Chapter 1.5).

1.1 The COVID-19 Pandemic as Crisis for Children and Families in Germany

At the end of January 2020, the first COVID-19 cases were detected in southern Germany. By March 2020, COVID-19 has evolved into a global pandemic, offsetting the first lockdown in Germany in the spring of 2020, followed by a loosening of restrictions in the summer of 2020, before the government implemented the next lockdown in the winter of 2020-2021 (Lu et al., 2021; Müller et al., 2020). From early on in the pandemic, researchers, practitioners, and politicians have pointed to family systems as melting pots of pandemic related public health measures that dramatically reduced physical social interactions in nearly every societal domain (e.g., Brown et al., 2020; Prime et al., 2020; Tso et al., 2022; Wade et al., 2020). Major risk factors for child development and well-being were identified such as child maltreatment, parental unemployment and strain, worsening of mental health, overcrowded and small space at home, social isolation from peers, simultaneous balancing of distance learning and home office, and closure of caregiving and educational facilities

(e.g., Loades et al., 2020; Ma et al., 2021; Meherali et al., 2021; Ravens-Sieberer et al., 2022; Tso et al., 2022). Thus, the COVID-19 pandemic can be conceptualized as particularly challenging time period for child and family development and well-being.

It is the aim of the current thesis to provide novel insights regarding our understanding of child psychological adjustment trajectories during the unfolding COVID-19 pandemic. To this end, the following chapters introduce lockdowns as major and volatile COVID-19 related public health measures (Chapters 1.1.1 - 1.1.2), present a theoretical framework for the study of child psychological adjustment during the COVID-19 pandemic highlighting the specific contributions of the current work (Chapter 1.2), describe the theoretical avenues (Chapters 1.3 - 1.5) leading to the research questions of this thesis (Chapter 2), and finish with a discussion of implications and contributions to theory, research, and practice (Chapter 3).

1.1.1 Lockdown as Key Governmental Public Health Measure

A central strategy in global responding to the rapid spread of SARS-CoV-2 consisted in non-pharmaceutical measures such as social distancing that by the end of 2020 were complemented by pharmaceutical measures such as vaccination campaigns. Regarding non-pharmaceutical measures, Germany as most countries implemented nationwide lockdown policies to decelerate the dissemination of the virus and thereby decrease fatalities and prevent a collapse of the national healthcare system (e.g., Gollwitzer et al., 2021; Prem et al., 2020; Schuchat, 2020). Lockdowns thereby consist of far-reaching policies containing measures to increase social distance, minimize individual mobility, and implement widespread regulations regarding quarantine and self-isolation (Meier et al., 2020). Specific lockdown policies might include closure of borders, closure of educational facilities, restaurants, and hotels, prohibition of cultural events and gatherings, prohibition of religious services and gatherings, prohibition of meetings with people outside the own household/limitation of number of people at social gatherings, home confinement and curfews, quarantine and self-isolation if exhibiting signs of COVID-19 infection, limitations on individual mobility, closure of playgrounds, prohibition of visitation hours in hospitals and care homes, closure of all non-essential shops (except, for example, grocery stores, banks, drug stores, petrol stations), home office obligations, and wearing protective masks (e.g., Johnson et al., 2021; Meier et al., 2020; Müller et al., 2020). Lockdowns usually comprise periods of a couple of weeks up to multiple months with the highest severity of restrictions up to date present in the first year of the COVID-19 pandemic.

The above lockdown policies point to a confluence of restrictions in the context of family systems. That is, from a theoretical perspective, families experience the interaction of a multitude of lockdown restrictions directly impacting their well-being during the COVID-19 pandemic (e.g., Adadms et al., 2020; Bronfenbrenner & Morris, 2006; Calvano et al., 2021; Foley et al., 2021; Johnson et al., 2021). Especially noteworthy family-related restrictions include the closure, reduced opening hours, or distance learning formats of educational facilities, the home office obligations for many parents, the prohibition or reduction of contacts outside the household such as meetings with friends and additional caregivers, and home confinement specifically for families with limited housing capacities. Consequently, lockdowns can be conceptualized as the arguably most challenging time periods for child and family well-being during the COVID-19 pandemic. The present thesis assesses child psychological adjustment during lockdown periods to capture how risk and protective factors impact child development and well-being during the most crucial phases of the COVID-19 pandemic.

1.1.2 Volatility of the COVID-19 Pandemic and Associated Public

Health Strategies

Among the most ubiquitous characteristics of the unfolding COVID-19 pandemic is its volatile, wave-like development with periods of high infection and death rates being followed by periods of subsiding infection numbers (Fisayo & Tsukagoshi, 2021; Glass, 2020; Karako et al., 2021; S. Liu et al., 2021; Lu et al., 2021; Salyer et al., 2021). This presents governments and people worldwide with the challenge to effectively adapt to a rapidly evolving state of the pandemic. Compared to other large-scale sociohistorical disruptions, this constitutes a particularity of the COVID-19 pandemic. That is, many other large-scale catastrophes are limited to a single constituting event or a state that evidences relative stability over a prolonged time period (Masten & Narayan, 2012). Examples of the former can include natural disasters, terrorism attacks, or recessions, examples of the latter can be wars, poverty, and regimes (Brooks-Gunn et al., 2013; Dybdahl, 2001; Kelley et al., 2010; Schneider et al., 2017; Yoshikawa et al., 2012).

The volatility of COVID-19 manifested itself in frequent adjustments of public health strategies during the first year of the pandemic in Germany (Lu et al., 2021). From March to May 2020, the German government implemented the first strict lockdown with closure of kindergartens and schools, a prohibition on private and public gatherings beyond the own household, home office obligations, closure of playgrounds, home confinement, and curfews

(Lu et al., 2021; Müller et al., 2020). Thereafter, a period of subsiding COVID-19 cases in the summer followed, partly due to the warm and dry weather and the many outdoor social activities (Kupferschmidt, 2020). Towards the fall of 2020, COVID-19 cases increased exponentially again, prompting a so-called “lockdown light” at the beginning of November 2020. The major difference to the first lockdown was that businesses and kindergartens as well as schools remained open (Kupferschmidt, 2020; Lu et al., 2021). Due to the disappointing effects of the “lockdown light”, the German government implemented a strict lockdown in mid-December, closing schools and kindergartens again or changing to distance learning formats, further restricting social contacts outside the own household, and setting night curfews (Lu et al., 2021). Thus, positively adapting to continually changing environmental circumstances can be conceptualized as a central element of child psychological adjustment during the COVID-19 pandemic.

Regarding child psychological adjustment and well-being during the COVID-19 pandemic, these volatile dynamics call for longitudinal research that spans multiple lockdowns and periods of relaxations (Benner & Mistry, 2020; Wade et al., 2020). That is, to gain a complete picture of the effects of the pandemic on child development, it is paramount to not only assess how individual lockdowns affect child well-being and problem behavior, but to investigate how children recover from lockdowns and how their well-being worsens going into subsequent lockdowns. Specifically, developmental science needs to conceptualize the COVID-19 waves as quasi-experimental opportunity to identify concrete effects of lockdowns and to investigate factors that account for recovery and deterioration in child adjustment. The present thesis relies on a naturalistic quasi-experimental design consisting of four assessment waves (A-lockdown, B-relaxation, B-relaxation, A-lockdown) across the first year of the COVID-19 pandemic in Germany. Thus, this thesis is among the first research projects to offer comprehensive evidence on the trajectories and determinants of child psychological adjustment during the pandemic.

1.2 Children’s Psychological Adjustment During the COVID-19 Pandemic

There is a myriad of factors and processes affecting child psychological adjustment during the COVID-19 pandemic. Conceptualizing determinants of children’s developing adjustment, one can propose three broad domains (see Figure 1). First, the social upheaval

following the pandemic (e.g., home confinement, closure of kindergartens/schools, social distancing, financial adversity) impacts caregiver well-being (e.g., stress), child adjustment (e.g., emotional and behavioral problems), and the how caregivers and children mutually affect each other's well-being. Second, existent family dynamics such as intrafamilial communication, organization, and beliefs (e.g., parent-child relationship) are impacted by individuals' well-being and can moderate associations between parental and child well-being as resilience factors. Third, all of the above are embedded into pre-existing family vulnerabilities (e.g., economic hardship, single parenthood) and into a temporal dynamic in which they are subject to constant change especially given the volatile unfolding of the COVID-19 pandemic.

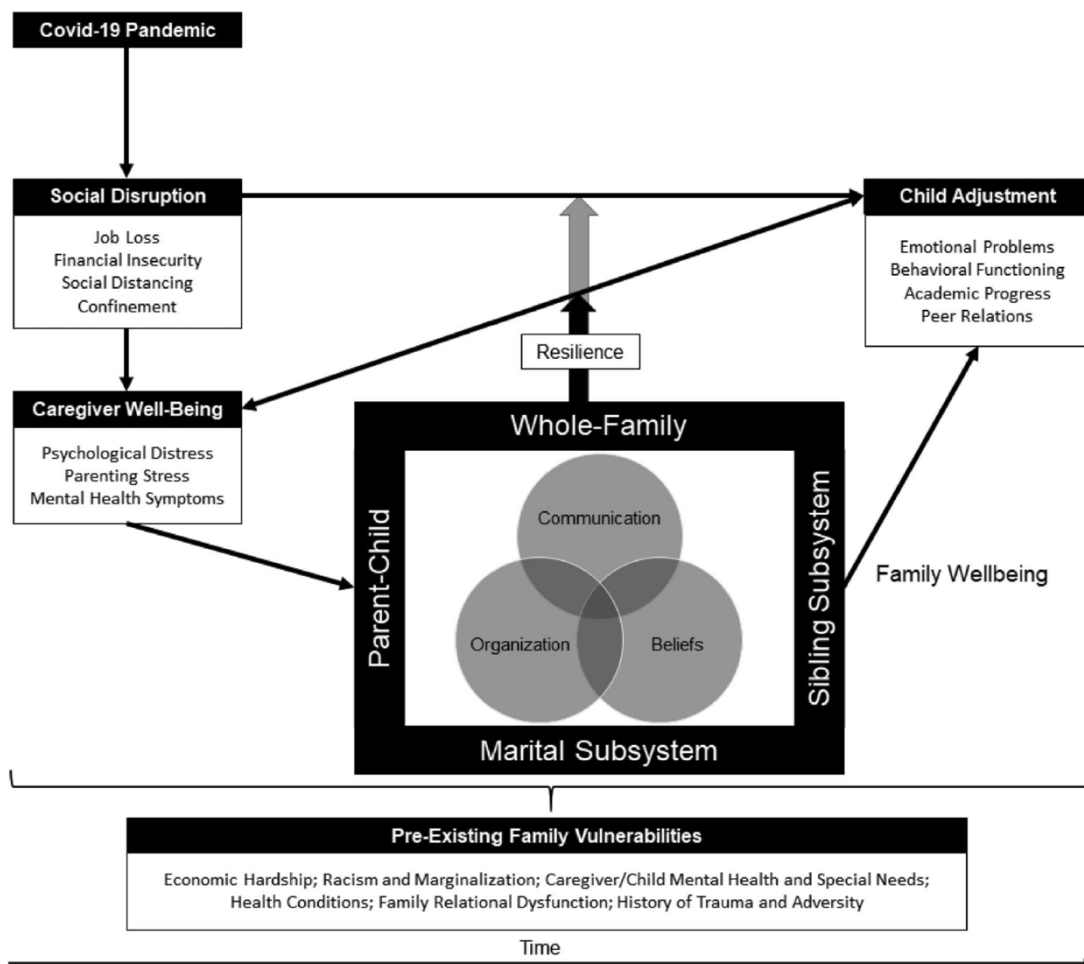


Figure 1. Factors and processes of child psychological adjustment during the COVID-19 pandemic (Prime et al., 2020).

The present thesis aims to address all three domains in furthering our understanding of child development and well-being during the pandemic. Drawing on developmental theories on child socio-emotional development and child-caregiver interactions (Bowlby, 1969; Feldman, 2012; Malti & Noam, 2016; Thompson, 2000) and on theories on parental stress and child development (Granic & Patterson, 2006; Masarik & Conger, 2017), the current work elaborates on the bidirectionality of caregiver stress and child adjustment during the pandemic. Following theories on parent-child relationship quality and resilience (Cicchetti, 2010; Cohen & Wills, 1985; Furman & Buhrmester, 1985; Walsh, 2015), the present thesis proposes the quality of parent-child relationships to be an important protective factor in child psychological adjustment during the pandemic. Finally, relying on a bioecological framework and on life course theory (Benner & Mistry, 2020; Bronfenbrenner & Morris, 2006; Elder, 1998), the present work claims that levels of child adjustment might change substantially due to lockdown-specific effects and aims to identify factors accounting for recovery and deterioration in child adjustment across lockdowns. Thus, the current thesis provides novel insights into child development in the context of the social repercussions of the COVID-19 pandemic.

1.3 Bidirectionality Between Parental Strain and Child Psychological Adjustment

The present thesis conceptualizes a bidirectional relation between parental strain and child adjustment during the COVID-19 pandemic. The following paragraphs will first explicate theoretical perspectives and associated empirical findings suggesting an impact of parental strain on child adjustment (Chapter 1.3.1) before addressing the reverse direction suggesting an impact of child adjustment on parental strain and bringing both directions together in a bidirectional framework (Chapter 1.3.2).

1.3.1 Impact of Parental Strain on Child Psychological Adjustment

A number of theoretical considerations suggest that parents experience increased levels of strain during the COVID-19 pandemic and that parental strain, in turn, adversely affects children's psychological adjustment. Parental strain or stress thereby can be defined as negative or aversive response regarding one's caregiving obligations especially in situations where parents have insufficient resources to meet caregiving demands (Abidin, 1992; Deater-Deckard & Scarr, 1996; Giannotti et al., 2021; Holly et al., 2019). From a

socioeconomic perspective, social disruptions during the unfolding COVID-19 pandemic fundamentally affected basic work and family parameters for parents. First, many caregivers experienced drastic changes in their working conditions (e.g., home office, reduced working hours, layoffs, adapting to digital working environments) resulting in decreased household income and/or increased household debt for a significant percentage (Brown et al., 2020; Chin et al., 2020). Second, prolonged periods of home confinement led to challenges in adjusting daily routines, crowding, and decreased opportunities for physical exercise in many cases (Adadms et al., 2020; Benner & Mistry, 2020; Johnson et al., 2021; Lucassen et al., 2021). Third, due to closure of educational facilities or the implementation of distance learning, parental demands increased with respect to caregiving hours, structuring children's schooling, and supporting children in regulating negative emotions and insecurities related to COVID-19 (Spinelli et al., 2021; Wang et al., 2021). Thus, a multitude of socioeconomic dimensions point to the possibility of increased parental stress during the COVID-19 pandemic especially during lockdown periods.

Theories of developmental and family science propose adverse pathways from parental stress to child well-being. The Parenting Stress Model (Abidin, 1992; Holly et al., 2019) claims that parental stress results in dysfunctional parenting which, in turn, has negative effects on child outcomes. In a similar vein, the Family Stress Model (Lucassen et al., 2021; Masarik & Conger, 2017; see also Granic & Patterson, 2006) holds that economic hardship and associated socioeconomic pressure lead to caregiver psychological distress, resulting in disrupted parenting and interparental problems, with disrupted parenting leading to child adjustment problems. Specifically, socioeconomic pressure may exhaust psychological and relational resources of caregivers, who, in turn, resort to maladaptive caregiving practices such as harsh parenting, inadequate addressing of child social and cognitive needs, or withdrawal of support and affection. Subsequent child adjustment difficulties may concern externalizing and internalizing problems, conduct disorders, problems with educational curricula, or physical health issues (Masarik & Conger, 2017). Much empirical research supports the propositions of the Family Stress Model (for reviews see Barnett, 2008; Conger et al., 2010; Masarik & Conger, 2017; Pinquart, 2017), the theoretical relation between parental stress and child well-being (Anthony et al., 2005; Ashford et al., 2008; Beckerman et al., 2017; Deater-Deckard & Panneton, 2017; Jones et al., 2017; Mackler et al., 2015), especially in contexts of large-scale sociohistorical disruptions (e.g., such as the Great Recession 2008 or the 2013 Boston Marathon bombing; Brooks-Gunn et al., 2013; Kerns et al., 2014; Schneider et al., 2015, 2017). Taken together,

different theoretical avenues propose an intricate link between parental strain and child psychological adjustment in general and specifically during major social disruptions such as the COVID-19 pandemic.

Burgeoning evidence from research on effects of the COVID-19 pandemic on parental strain underscores theoretical notions that (1) parents experience elevated levels of strain and that (2) parental strain negatively affects child adjustment. Regarding parental stress, research shows that the perceived difficulty of lockdowns and quarantine related positively to parental stress (Giannotti et al., 2021; Spinelli et al., 2020) and that about one fifth of parents reported significant parenting-related exhaustion, especially when parents were single, had a child with special needs, had a large number of children, or children at younger ages (Marchetti et al., 2020). Another study reports comparable findings on parents of preschool and school children being particularly at risk for elevated stress (Toppe et al., 2021). Similarly, in a different study, over one fifth of caregivers reported clinically relevant PTSS, which is a higher rate than reported by non-caregiving individuals (Russell et al., 2022). Pointing in the same direction, about one fourth of parents reported worsening mental health for themselves after the first lockdown (Patrick et al., 2020). More than half of parents reported stress due to social distancing and closure of educational and childcare facilities (Calvano et al., 2021). Taken together, these findings demonstrate the substantial strain experienced by parents especially during phases of COVID-19 related lockdowns and strict governmental restrictions.

Another strand of research examining relations between parental stress and child adjustment during the pandemic underlines theories proposing a negative impact of parental stress on child well-being. Many studies show that COVID-19 related caregiver stress links to higher levels of children's COVID-19 related stress as perceived by their parents (Cusinato et al., 2020; Russell et al., 2020), links to increases in child behavioral problems (e.g., internalizing and externalizing behaviors) and emotional problems (Crescentini et al., 2020; Kim et al., 2021; Li & Zhou, 2021; Lionetti et al., 2022; Marchetti et al., 2020; Morelli et al., 2020; Spinelli et al., 2020; Sun et al., 2022), links to increases in harsh and caustic parenting (Chung et al., 2020; Daks et al., 2020) with authoritarian parenting positively predicting increases in preschoolers' anxiety symptoms (Zhang et al., 2022), and links to increased difficulties in overall child adjustment (Romero et al., 2020). One study specifically shows that parental distress positively predicted harsh parenting, an effect attenuated by partner support, and that parental distress negatively predicted responsive parenting and parent-child relationship quality, an effect attenuated by cooperative

coparenting (McRae et al., 2021). In a different study, maternal negative perceptions of the COVID-19 pandemic and lack of support positively related to child internalizing and externalizing problems, an effect that was mediated by maternal anxiety and coercive parenting (Hanetz-Gamliel et al., 2021). Higher stress levels in mothers also predicted an increase in the attribution of negative emotions to their children at the expense of positive emotions (Petrocchi et al., 2020). Thus, a multitude of studies highlight the detrimental effects of parental COVID-19 related stress on parenting practices, on children's emotional well-being, and ultimately on child psychological adjustment during the COVID-19 pandemic.

1.3.2 Impact of Child Psychological Adjustment on Parental Strain

The above evidence makes a strong case for unidirectional relations of parental strain affecting child psychological adjustment during the pandemic. From a theoretical perspective, however, the reciprocal direction of child adjustment difficulties affecting parental strain appears to be just as conceivable. That is, as children face challenges in their socio-emotional, cognitive, and physical well-being, this might negatively impact parental stress. Major developmental theories can contribute to conceptualizing this reciprocal relation of child psychological adjustment affecting parental strain and thereby argue for bidirectionality between parental strain and child adjustment.

From an attachment theoretical perspective (Bowlby, 1969; Thompson, 2000), children seek closeness to their attachment figures (i.e., their caregivers) if they experience stressful events, irritations, or emotional uncertainties. In such situations, children rely on their caregivers to regulate their emotional distress and regain feelings of security and control. In the context of the evolving COVID-19 pandemic, there are a vast number of proximal child-related disruptions that could cause an activation of the child attachment system (Bate et al., 2021). Among the most pertinent factors one can count the sudden closure of educational facilities and prohibition of peer contact, uncertainty concerning the effects of a COVID-19 infection and associated anxiety regarding a possible infection of oneself or close others, home confinement with its changed routines and possible overcrowding, and restrictions on physical mobility and leisure activities. As children's resulting experience of anxiety, distress, and uncertainty leads them to seek emotional support from and proximity to their parents, this increases caregiving demands and could subsequently lead to elevated parental strain (child adjustment difficulties → parental strain). At the same time, elevated parental strain due to balancing new working conditions and

socioeconomic stressors could lead to maladaptive parenting strategies and subsequently result in increased child adjustment difficulties (parental strain → child adjustment difficulties). Thus, (1) increased child insecurities and associated caregiving demands resulting in higher parental strain and (2) increased parental strain resulting in higher child adjustment difficulties can be conceptualized as reciprocal relationship in which parental strain and child adjustment difficulties bidirectionally affect each other during the COVID-19 pandemic.

From a social-cognitive perspective (e.g., Lemerise & Arsenio, 2000), children possess limited capacities to autonomously cope with cognitive and emotional challenges arising over the course of the pandemic. Especially during early and middle childhood, children greatly develop in their cognitive (e.g., Feldman, 2012), self-regulative (e.g., Best & Miller, 2010), and socio-emotional (e.g., Malti & Noam, 2016) capacities. Cognitively speaking, children might struggle to conceptualize the COVID-19 disease itself and the reasons for restrictive measures to slow the spread of the virus. For example, older preschoolers outperform younger preschoolers in their understanding of disease transmission (DeJesus et al., 2021). Regarding self-regulation, children might not be able to adequately cope with emotions like anxiety, anger, and frustration arising in response to major COVID-19 restrictions. That is, children's limited capacities regarding attentional control, inhibitory control, and cognitive flexibility substantially restrict the available strategies to self-regulate without external support. Finally, children's developing theory of mind, language abilities, and empathic competencies might restrict their abilities to navigate the complex socio-emotional dynamics in their family and participate as an active social agent. Thus, children require parental support and scaffolding in their efforts to psychologically adjust to the COVID-19 pandemic, which, in turn, could increase parental strain.

Following a developmental systems account (cf. Foley et al., 2021; Lerner, 2006), children require experiences of social interactions with others for their socio-emotional well-being and development. Especially friendships constitute strong emotional ties between children that gain importance during childhood. Cooperative, reciprocal interactions with peers provide children with emotional support, enable children to jointly reason and construct social meaning, foster well-being through shared experiences, and increase emotion regulation abilities (Hay et al., 2004; Laursen & Hartup, 2002; Newcomb & Bagwell, 1995). With many COVID-19 related public health measures, peer interactions are substantially reduced, leaving children with their family or household as primary context of

social interactions. This might put pressure on the family system and increase the need for child-parent interactions, thus raising caregiving demands and subsequently parental strain.

There is vast empirical evidence for the threatening impact of the COVID-19 pandemic on children's well-being (for reviews see Imran et al., 2020; Meherali et al., 2021). A substantial number of studies indicated child anxiety and loneliness (Raviv et al., 2021; Stassart et al., 2021), child worsening mental, emotional, and behavioral health (Bosch et al., 2022; Francisco et al., 2020; Newlove-Delgado et al., 2021; Patrick et al., 2020; Tso et al., 2022; Yeasmin et al., 2020), increased externalizing, internalizing, and dysregulated behavior (Hanno et al., 2021; Sicouri et al., 2022), elevated stress levels and constant or decreased life satisfaction (Choi et al., 2021; Kurz et al., 2022; Mactavish et al., 2021), sleep disorders (Cellini et al., 2021; Fasano et al., 2021), adjustment difficulties to home learning (Segre et al., 2021), and increased irritation and anger (Sama et al., 2021). In one study, two-thirds of children and adolescents reported high stress due to the COVID-19 pandemic with decreased quality of life, increased mental health problems and anxiety levels. These effects were especially pronounced among children from low socioeconomic status and from homes with little space (Ravens-Sieberer, Kaman, Erhart, Devine, et al., 2021). A related meta-analysis found the pooled prevalence of child depression, anxiety, sleep disorders, and posttraumatic stress symptoms to be at 29%, 26%, 44%, and 48%, respectively (Ma et al., 2021; see also Q. Liu et al., 2021). Many of these negative effects seem to be strongest among younger children (Matalí-Costa & Camprodon-Rosanas, 2022; but see Eales et al., 2021). Thus, ample evidence speaks for the adverse effects of the COVID-19 pandemic on child psychological adjustment and well-being.

However, there are surprisingly few studies relating child emotional and behavioral problems to parental stress in the context of the COVID-19 pandemic. Some work demonstrates that higher child internalizing problems and anxiety were linked to greater parental depression and anxiety (Dubois-Comtois et al., 2021) and that child behavioral, emotional, and hyperactivity difficulties contributed to parental distress (Mazza et al., 2021). So far, there exists no clear conceptualization of the bidirectionality of parental stress and child psychological adjustment, although previous finding point to the fruitfulness of a transactional account in other contexts (Neece et al., 2012). Following the Parenting Stress Model and the Family Stress model with associated empirical findings, parents experience elevated parental strain during the pandemic that should lead to maladaptive parenting and ultimately child adjustment difficulties. Following attachment theory, a social-cognitive perspective, and developmental systems theory with associated findings, children's

increased need for parental support due to their limited capacities to autonomously navigate pandemic related challenges should lead to increased caregiving demands and therefore elevated parental strain. Bringing both sides together, the present thesis proposes parental strain and child adjustment to be bidirectionally related. Thus, it takes a first step in closing the research gap on reciprocal relations between parental and child well-being and thereby generates important insights into our understanding of the dynamic processes leading to parental and child adjustment during the COVID-19 pandemic.

1.4 Parent-Child Relationship Quality as Resilience Factor

The parent-child relationship can be characterized by mutual communication, connectedness and closeness, supportive interactions, and shared experiences within which caregivers nurture and protect children, scaffold child development, and transmit cultural knowledge and practices (Du et al., 2021; Masten, 2018). Negative qualitative aspects of the parent-child relationship involve factors such as high levels of conflict and child dominance while positive qualitative aspects involve intimacy and the caregiver's recognition of the child's activities and competencies (Furman & Buhrmester, 1985).

From a theoretical perspective, the parent-child relationship quality can be conceptualized as more indirectly affected by COVID-19 related public health measures than parental and child stress and well-being. While COVID-19 related public health restrictions directly impacted child and caregiver stress (see Chapter 1.3), the parent-child relationship quality represents a general sense of closeness that caregivers and children started into the pandemic with. That is, the parent-child relationship quality can be considered more of a relational condition existing independently of the pandemic whereas COVID-19 related stress was exclusively induced by the pandemic. As such, the parent child-relationship quality might be considered a possible protective factor that impacted to what extent COVID-19 related stressor affected children and caregivers (Masten & Narayan, 2012). Indeed, parent-child relationships have been conceptualized as one of the central resilience factors in theories of child resilience and its development (Masten, 2018; Walsh, 2015), thereby also considering contexts of extreme stress exposure and social upheaval (Cicchetti, 2010; Masten & Narayan, 2012). Previous research shows that strong family and parent-child relationships can account for better child adjustment to political violence and can moderate to what extent disaster exposure (e.g., tsunami) translates into symptoms of PTSD and depression (Qouta et al., 2008; Wickrama & Kaspar, 2007). The parent-child

relationship quality might act as a moderator of child and family adjustment in contexts of large-scale social disruption (Hazel et al., 2014; Miner & Clarke-Stewart, 2008; Papp et al., 2005; see also Schofield et al., 2008). Thus, children might be better able to adjust to COVID-19 related restrictions and changes if they can rely on a positive relationship quality.

Relatedly, the parent-child relationship quality can be conceptualized as a more stable and less volatile construct than COVID-19 induced parental stress and child adjustment difficulties. Regarding COVID-19 related stress, it is particularly public health measures and restrictions such as lockdowns that give rise to the experience of stress and compromise parent and child well-being. This becomes evident in longitudinal studies showing the stark increases in stress, lowered quality of life, and adjustment difficulties among children and parents from pre-pandemic to the first lockdown and the general decreases in stress after loosening of lockdown restrictions (e.g., Dellagiulia et al., 2020; Johnson et al., 2021; Khoury et al., 2021; Ma et al., 2021; Ravens-Sieberer et al., 2022; Ravens-Sieberer, Kaman, Erhart, Otto, et al., 2021). In contrast, there are a number of reasons why the parent-child relationship quality might be less negatively affected by the COVID-19 pandemic due to possible positive effects of lockdowns on family relationships. First, shared family experiences of coping with challenging lockdown restrictions can lead to positive effects on the family system and its relationships. This phenomenon has been investigated as posttraumatic growth in other contexts (Calhoun & Tedeschi, 2014; Prime et al., 2020). Second, lockdown restrictions such as home confinement, home office regulations, and restrictions of social gatherings lead to an increase in time spent within the family. This increased time presents opportunities for collaborative, joint activities and can thereby promote family relationships and family satisfaction (Dvorsky et al., 2021; Masten, 2001; Möhring et al., 2021). Research in the context of the COVID-19 pandemic supports notions on the higher stability of the parent-child relationship quality. While some studies report that the parent-child relationship quality is negatively affected by child and parental stress and depression (Chung et al., 2020; Russell et al., 2020, 2022), others report aspects of relationship steadiness and positive relationship changes (Du et al., 2021; Vaterlaus et al., 2021), and again others suggest no change in the parent-child relationship (Chin et al., 2020). Subsequently, based on the possibly more balanced positive and negative effects of the COVID-19 pandemic on the parent-child relationship quality, it should represent a construct with higher stability levels than pandemic induced stress. Thus, the parent-child relationship quality might act as a stable resilience factor supporting child psychological adjustment across the dynamic changes of the COVID-19 pandemic.

Past work in the context of the COVID-19 pandemic indeed demonstrates that a positive parent-child relationship quality is related to fewer child internalizing symptoms (Du et al., 2021) and that a positive parent-child relationship quality is related to less child emotional and behavioral problems (Nicoli et al., 2022). In one study, the parent-child relationship quality moderated effects from parents' emotional health on child emotional health. The higher conflict and the lower positivity in the parent-child relationship, the higher were relations between parents' and children's emotional health (Bate et al., 2021). These studies suggest that the parent-child relationship quality could constitute an important resilience factor for child psychological adjustment during the COVID-19 pandemic. However, the evidence is still thin and inconclusive. Given the strong theoretical reasons pointing to a central role of the parent-child relationship quality in child coping with the pandemic, this calls for further studies to paint a more complete picture. The present thesis addresses this research gap, specifies how the parent-child relationship quality could contribute to child psychological adjustment as a resilience factor, and thereby generates important knowledge on protective factors of child well-being during the COVID-19 pandemic.

1.5 Trajectories and Determinants of Child Psychological Adjustment Across Lockdowns

One defining characteristic of the social disruptions caused by the COVID-19 pandemic is the volatile dynamic of quick changes in infection and death rates (Fisayo & Tsukagoshi, 2021; Glass, 2020; Karako et al., 2021; Lu et al., 2021; Salyer et al., 2021). In only a few months' time, the situation can evolve from high case numbers and hospitalization rates associated with strict public health measures to a situation with markedly decreased COVID-19 related infection threats and associated relaxations of restrictions. With pharmaceutical strategies (e.g., vaccinations) complementing non-pharmaceutical strategies (e.g., lockdowns) over time, public health measures themselves are also subject to change as many countries go through a number of COVID-19 waves (e.g., Büssing et al., 2022). It follows that social disruptions and stress caused by the COVID-19 pandemic might be particularly pronounced at some times (e.g., lockdowns) and less pervasive at other times (e.g., periods of loosened restrictions; see Figure 1). However, the developmental trajectories of children's psychological adjustment as they transition through periods of differing pandemic related

social upheaval are hardly studied and it is an open question what factors account for relaxation and deterioration of child stress and difficulties. Multi-wave longitudinal research conceptualizing the changes in lockdowns and relaxations as naturalistic quasi-experimental design (e.g., A-lockdown, B-relaxation, B-relaxation, A-lockdown) is needed to examine specific lockdown effects on child adjustment. This is a primary objective of the current thesis.

According to life course theory (Benner & Mistry, 2020; Elder, 1998), child development and adjustment is intertwined with the lives of significant others (e.g., parents, teachers, friends) and is also connected to the broader sociohistorical context. During the COVID-19 pandemic, child trajectories of well-being can be conceptualized to diverge due to unexpected, nonnormative turning points (e.g., lockdowns, public health measures) deflecting developmental trajectories (Almeida & Wong, 2009; Benner & Mistry, 2020). But what shape do these deflections take? Besides the theoretical significance in specifying child trajectories of adaptation, identifying the shape of developmental deflections and thus the specific effects of lockdowns has high practical relevance for the design of interventions during the COVID-19 pandemic.

There are multiple theoretical possibilities for trajectories of child adjustment out of which two seem especially apt in the context of the COVID-19 pandemic. First, child psychological adjustment could parallel the wave-like implementations of strict and loosened public health measures (cf. Benner & Mistry, 2020). That is, child emotional well-being and behavioral adjustment might decrease in response to strict public health measures and increase again in response to loosened restrictions (i.e., temporal deflections of adjustment trajectories). The rationale here holds that on the one hand, child adjustment would benefit from relaxations of restrictions such as increased peer interactions, increased mobility and leisure activities, and reopened educational facilities. On the other hand, as restrictions become heavier, child adjustment and well-being would decrease (e.g., Hay et al., 2004; Loades et al., 2020; Prime et al., 2020). From a developmental perspective, this would mean that children could recover during loosened restrictions and might mostly experience negative effects of the pandemic during lockdowns. Thus, in the wave trajectory, there would be relaxing periods between lockdowns allowing children to recover.

A second theoretical possibility holds that child psychological adjustment might steadily decrease as the pandemic continues. That is, there would be a general negative trend in declining child well-being and adjustment. The rationale behind this trajectory claims that even during times of loosened restrictions, many COVID-19 related stressors might continue

to constitute substantial proximal threats to child well-being and adjustment (Bronfenbrenner & Morris, 2006). Among those are socioeconomic stressors such as caregiver job loss or reduction of working hours, financial insecurity, continuing changes of educational caregiving and schooling (e.g., combination of offline and online learning) as well as psychological stressors such as expectations and cognitions concerning the further course of the pandemic or anxiety concerning a COVID-19 infection of oneself or of close others (e.g., Kupferschmidt, 2020; Lu et al., 2021; Müller et al., 2020). From a developmental perspective, this would suggest that the COVID-19 pandemic despite its wave-like loosening and tightening of public health measures poses a continual risk factor for child adjustment. Thus, in the decline trajectory, there would be steady decreases of child psychological adjustment without phases of recovery.

Child trajectories of adjustment during the COVID-19 pandemic are not uniform, but vary between individuals. Thus, the theoretical question arises as to what determines interindividual differences in trajectories. Regarding the wave trajectory, some children might be more heavily affected by public health measures and thus display high adjustment difficulties during the lockdowns and strong recovery phases during periods of loosened restrictions (wave trajectories with high volatility). Other children might be less impacted by public health measures and therefore display lower adjustment difficulties during the lockdowns and weaker recovery phases during periods of loosened restrictions (wave trajectories with low volatility). In the same way, some children might experience more pronounced decreases in their well-being and adjustment than others (decline trajectories with high or low negative slope values). From an attachment and child-caregiver relationship perspective, relationship quality could be conceptualized as a mitigating factor leading to trajectories of low volatility and slopes (Hazel et al., 2014; Masten & Narayan, 2012; Miner & Clarke-Stewart, 2008; Thompson, 2000). From a resiliency perspective, pre-existing family vulnerabilities and parental stress (see Figure 1) could constitute risk factors and child competencies and close relationships could constitute protective factors (Cicchetti, 2010; Masten, 2018; Prime et al., 2020). From a life course theoretical perspective and following theories on child socio-emotional development, adjustment trajectories might evidence high volatility and steep slopes especially for children in early and middle childhood (Benner & Mistry, 2020; Elder, 1998; Lemerise & Arsenio, 2000; Malti & Noam, 2016). Taken together, it is paramount to identify trajectories of child adjustment and determinants thereof to get a more complete picture of the longitudinal effects of the unfolding COVID-19 pandemic.

Only a minority of studies has investigated child psychological adjustment during the COVID-19 pandemic longitudinally. Most research hereby employed two measurement points (for exceptions see Berry et al., 2021; Ravens-Sieberer et al., 2022; Raw et al., 2021) with the majority of studies focusing on comparisons between pre-pandemic and first lockdown or between first lockdown and the subsequent period of loosened restrictions. Importantly, relying on only two measurement points leads to methodological limitations as one cannot separate specific lockdown effects from general developmental trends such as age related changes.

Prior work demonstrates that children's sleep quality decreased during the first lockdown, that emotional and behavioral difficulties increased during the first lockdown (Dellagiulia et al., 2020; Waite et al., 2021), that parental stress as well as symptoms of parental depression and anxiety decreased and that children positively adjusted in their emotional and behavioral difficulties but not in their conduct problems from first lockdown to loosened restrictions (Berry et al., 2021; Johnson et al., 2021; Raw et al., 2021), that quality of life decreased, worries about family, friends, and hometown increased, but global mental health problems did not change significantly from lockdown 1 to lockdown 2 (Brandstetter et al., 2022; Ravens-Sieberer, Kaman, Erhart, Otto, et al., 2021), and that physical and psychological well-being decreased and internalizing and externalizing problems increased between pre-pandemic and pandemic (Khoury et al., 2021; Vogel et al., 2021). In one study, the prevalence of low quality of life increased from lockdown 1 to lockdown 2 and decreased from lockdown 2 to loosened restrictions with similar findings for mental health problems, anxiety, and depressive symptoms (Ravens-Sieberer et al., 2022). Taken together, the evidence from the few longitudinal studies during COVID-19 is inconclusive with respect to the trajectories of child adjustment across lockdowns and the factors determining interindividual differences in trajectories. Notably, there is practically no work at the current moment that relies on a naturalistic quasi-experimental design to separate lockdown effects from general developmental changes. The current thesis aims at making a first step in closing this research gap by investigating trajectories of child psychological adjustment and its determinants across four measurement points (A-lockdown, B-relaxation, B-relaxation, A-lockdown). It thereby provides crucial evidence to further our understanding of how children deal with challenges during the COVID-19 pandemic and informs our theoretical conceptions of how social disruptions impact child development.

2 The Current Thesis

2.1 Aims and Research Questions

The present thesis aims at investigating child psychological adjustment during the COVID-19 pandemic with its quickly changing public health measures (i.e., periods of lockdowns and loosened restrictions). Specifically, the current thesis examines the cross-sectional and longitudinal interplay of parental stress, parent-child relationship quality, and child well-being to identify trajectories and determinants of child psychological adjustment during the first year of the COVID-19 pandemic in Germany.

The first aim of this thesis is to address the bidirectionality of parental stress and child well-being and problem behavior during the COVID-19 pandemic. As outlined above, several COVID-19 related public health measures (e.g., changed working conditions, financial insecurity, home confinement, closure of educational facilities and implementation of distance learning) drastically changed the social and economic situation of families (Brown et al., 2020; Chin et al., 2020; Lu et al., 2021). These social disruptions were claimed to increase caregiving demands and parental stress and to negatively impact child psychological functioning (Prime et al., 2020). But how are parental stress and child adjustment related? On the one hand, following the Parenting Stress Model (Abidin, 1992) and the Family Stress Model (Masarik & Conger, 2017), parental stress should lead to an increase of inadequate parenting practices, thereby threatening child well-being. On the other hand, children's need for parental availability during insecurity (Thompson, 2000), reliance of children on caregivers to socio-cognitively navigate COVID-19 related changes (Lemerise & Arsenio, 2000), and restrictions of peer interactions and friendships (Hay et al., 2004; Laursen & Hartup, 2002) should lead to increased child needs regarding their caregivers' availability and subsequently result in higher parental stress. While there exists ample evidence for the first path (e.g., Crescentini et al., 2020; Kim et al., 2021; Li & Zhou, 2021), the work examining the second path and conceptualizing the bidirectionality of parental stress and child well-being is scarce. However, from a theoretical and practical

perspective it is paramount to delineate how parental stress and child well-being reciprocally affect each other cross-sectionally and longitudinally to generate new insights into child and family functioning and thereby contribute to a more complete picture of child adjustment during the COVID-19 pandemic. Thus, the first research question is to identify the factors (e.g., parental stress, sociodemographic factors) compromising child well-being (research question 1a) and to subsequently assess if and to what extent child adjustment and parental stress reciprocally relate to each other (research question 1b).

The second aim of the present thesis is to investigate if and to what extent the parent-child relationship quality acts as a resilience factor in child psychological adjustment during the COVID-19 pandemic. The parent-child relationship quality is characterized by closeness and supportive, mutual interactions between children and their parents. As such, it might represent a crucial protective factor buffering against the negative effects of COVID-19 related stressors (Du et al., 2021; Masten, 2018). Central theories of resilience have claimed the importance of the parent-child relationship quality as resilience factor in social disruptions (Masten, 2018; Walsh, 2015). In the context of the COVID-19 pandemic, first evidence suggests that the parent-child relationship quality might support child adjustment and buffer against negative relations between parental and child emotional health (Bate et al., 2021; Du et al., 2021; Nicoli et al., 2022). As evidence from prior work is thin, cross-sectional, and mostly based on unidirectional conceptualizations of parental stress affecting child well-being, the present thesis aims to close this research gap. It assesses if and to what extent the parent-child relationship quality can act as a protective factor in bidirectional, longitudinal associations between parental strain and child well-being (research question 2). Thus, the present work offers crucial evidence on pathways of child adaptive coping in the context of the COVID-19 pandemic.

The third aim of the current thesis is to delineate trajectories and related determinants of child psychological adjustment during the COVID-19 pandemic relying on a naturalistic quasi-experimental design (A-lockdown, B-relaxation, B-relaxation, A-lockdown). While influential developmental theories hold that large-scale sociohistorical disruptions can lead to changes and deflections in child developmental trajectories (Baltes et al., 2006; Benner & Mistry, 2020; Bronfenbrenner & Morris, 2006; Elder, 1998), it is unclear what these trajectories look like. Theories on the importance of peer interactions and friendships in childhood (Hay et al., 2004; Laursen & Hartup, 2002) would predict a wave-like trajectory. That is, child adjustment trajectories might follow a wave-like function thereby paralleling the wave-like increase and decrease of public health measures (e.g., lockdowns and loosened

restrictions). Thus, children would recover as restrictions get loosened (e.g., increased peer interactions, mobility, leisure activities) and decrease in well-being as stricter restrictions become implemented. Theoretical considerations on the continued exposure to stressor even in times of loosened restrictions (e.g., job loss, financial insecurity, anxiety, negative expectations of the future) would predict a trajectory of steadily decreasing adjustment (Kupferschmidt, 2020; Lu et al., 2021; Prime et al., 2020). For both trajectories, attachment and resiliency perspectives (Hazel et al., 2014; Masten & Narayan, 2012; Thompson, 2000) would propose that the parent-child relationship quality could buffer against negative COVID-19 related effects, that is, account for interindividual differences in trajectories. Although a minority of studies examined longitudinal changes of child well-being during the COVID-19 pandemic, previous work is inconclusive with regards to developmental trajectories spanning multiple lockdowns and accounting for risk and protective factors (Berry et al., 2021; Brandstetter et al., 2022; Ravens-Sieberer et al., 2022). In addition, most previous work comprises two measurement points and thus faces methodological challenges in separating specific lockdown effects from general developmental trends. The present thesis advances the field by investigating the possibility of different trajectories of child psychological adjustment during the COVID-19 pandemic and determinants thereof by means of a naturalistic quasi-experimental design (research question 3). Thus, the present work furthers our understanding of child psychological adjustment over the quickly changing COVID-19 related restrictions and thereby contributes to our theoretical understanding of child development during large-scale sociohistorical disruptions.

2.2 Outline of the Thesis and Author Contributions

Three studies comprising four measurement points (lockdown 1, relaxation 1, relaxation 2, lockdown 2) were carried out to address the research questions specified above. The studies were part of a larger longitudinal research project on the effects of the COVID-19 pandemic on child, adolescent, and family functioning. In each of the studies, parents responded to an online questionnaire on the situation and adjustment of parent and child during the COVID-19 pandemic. Data associated with studies 1 and 2 are openly available on the Open Science Framework (see Appendices A and B for details). Concerning study 3, data will be made openly available upon publication. Given the above theoretical consideration on the especially pronounced effects of COVID-19 related measures in early and middle childhood,

this work focused on 3- to 10-year-olds (at the first measurement point). Table 1 shows the author's contributions to the three studies.

Table 1. Author contributions to the studies

	Study design	(Supervision of) Data collection	Data analysis	Manuscript writing
Study 1 (+)	(✓)	✓	(✓)	(✓)
Study 2 (+)	✓	✓	(✓)	✓
Study 3	✓	✓	✓	✓

Note. ✓ major contribution, (✓) joint contribution, (+) joint first authorship

Study 1 addressed research question 1a, that is, parental and child COVID-19 related well-being and the factors potentially threatening child well-being (e.g., parental stress, sociodemographic factors). To this end, parents of 3- to 10-year-olds ($N = 2,672$) reported on sociodemographic factors (e.g., single parenthood, siblings, changes in work environment), parental stress as well as child psychological well-being and problem behavior during the first lockdown in the spring of 2020 in Germany. We hypothesized an increase in parental stress and child problem behavior, a decrease in child well-being, and being an only child, single parenthood, and young age constituting risk factors. Results showed that the lockdown induced stress in both, parents and children. Not being able to meet friends and family outside the household represented the most challenging aspect for children. Older children (7-10 years) displayed more emotional problems, while younger children (3-6 years) displayed more hyperactivity and conduct problems. Single parenthood and being an only child emerged as risk factors to child problem behaviors. Child stress, parental stress, and missing other children negatively predicted children's general life satisfaction. These results demonstrate the negative effects of COVID-19 related lockdowns on child psychological well-being and problem behavior and are a first indicator that parental stress can lead to lower child adjustment. At the same time, they underscore theories on the importance of peer relations and friendships in early and middle childhood.

Study 2 targeted research question 1b, that is, if and to what extent there is a bidirectional relation between parental stress and child well-being, and research question 2, that is, if and to what extent the parent-child relationship quality constitutes a protective factor in the hypothesized longitudinal reciprocity of parental stress and child well-being. Specifically, we examined how parental strain and child well-being and problem behavior changed after the loosening of restrictions following the first lockdown, how these changes affected each other and whether parent-child relationship quality would buffer against

negative effects. We hypothesized that parental strain and child adjustment would be reciprocally related, that changes in one would predict changes in the other, and that the parent-child relationship quality would moderate these relations. To this end, parents reported on their strain, child well-being and problem behaviors, and the parent-child relationship quality during the peak of the first lockdown in the spring of 2020 ($N = 2,921$, T1) and after restrictions were loosened in the summer of 2020 ($N = 890$, T2). Results demonstrated a decrease in parental strain and child problem behaviors and an increase in child well-being from T1 to T2. Cross-lagged panel models showed that child variables at T1 (well-being, problem behaviors) predicted parental strain at T2 more strongly than the other way around. Parent-child relationship quality emerged as a moderator with less negative aspects in the relationship decreasing the relation between child problem behavior at T1 and parental strain at T2. True intraindividual change models indicated that changes in parental strain emerged as predictor of changes in child well-being and problem behavior. Thus, study 2 makes a strong case for bidirectionality between parental strain and child adjustment, speaking to frameworks that reciprocally conceptualize parental and child adjustment over the course of sociohistorical disruptions. The results also underline and expand resiliency theory by identifying the parent-child relationship quality as important protective factor.

Study 3 addressed research question 3, that is, the possible trajectories of child adjustment across multiple lockdowns and the possible determinants (i.e., parental stress, parent-child relationship quality) accounting for interindividual differences in adjustment. Specifically, we examined whether child adjustment trajectories would parallel the wave-like increase and decrease in public health measures or whether trajectories would show steady declines in well-being and problem behavior. We hypothesized that trajectories of child adjustment would be wave-like except for family-related well-being as family stressors often remain high during loosened restrictions (e.g., financial insecurity, changed working conditions). To this end, we employed a naturalistic quasi-experimental design (A-B-B-A) with four measurement points (T1 - first lockdown spring 2020, $N = 1,769$; T2 - loosened restrictions summer 2020, $N = 873$; T3 - loosened restrictions fall 2020, $N = 729$; T4 - second lockdown winter 2020/21, $N = 748$). Parents reported their strain (T1-T4), the parent-child relationship quality (T1-T3), and child problem behavior and well-being (T1-T4). Results indicated that child adjustment generally followed wave-like functions with a period of recovery between both lockdowns. Child family-related well-being steadily declined over the first year of the pandemic. Parental strain at T1 predicted the degree of recovery from

adjustment difficulties from the lockdown into the period of loosened restrictions (T1 → T2) and parental strain and negative aspects of the relationship quality at T3 predicted the degree of increase in adjustment difficulties from the period of loosened restrictions to the second lockdown (T3 → T4). Thus, higher parental strain and more negative aspects in the parent-child relationship were related to a greater volatility of individual trajectories (i.e., greater recovery from T1 → T2 and greater deterioration from T3 → T4). These results speak for theories highlighting the temporal deflection of developmental trajectories due to sociohistorical disruptions. Thus, the present work contributes crucial insights to our conceptions of child development during social upheaval.

3 General Discussion

The COVID-19 pandemic constitutes a fundamental global crisis in the twenty-first century. It has led to unprecedented changes down to the most basic human social interactions such as major restrictions of social interactions, individual mobility, and in-person education and work. Contrary to many other large-scale social disruptions such as natural disasters or wars (Masten & Narayan, 2012), the high volatility of the unfolding COVID-19 pandemic constitutes a major challenge for governments worldwide as they employ pharmaceutical and non-pharmaceutical measures to contain the damages of the virus (Fisayo & Tsukagoshi, 2021; Karako et al., 2021; Lu et al., 2021; Salyer et al., 2021). These public health measures constitute particular threats for family and child functioning. The present thesis is among the first to provide a comprehensive, longitudinal picture of the development of child adjustment during the COVID-19 pandemic.

Developmental theories and previous studies (1) have identified parental stress as detrimental to child adjustment with the parent-child relationship possibly buffering against negative effects and (2) have suggested developmental deflections in children's adjustment trajectories. However, little work (1) has conceptualized COVID-19 related negative effects between parents and children as reciprocal, (2) has examined the importance of the parent-child relationship quality as a protective factor in child longitudinal adjustment trajectories, and (3) has specified specific lockdown effects in longitudinal adjustment trajectories and has aimed to explain interindividual differences therein. The present thesis addresses these research gaps. Results show that parental and child adjustment difficulties reciprocally affect each other, that the parent-child relationship quality constitutes an important resilience factor in child longitudinal coping efforts, and that child adjustment trajectories (except for family-related well-being) parallel the wave-like interplay between lockdowns and relaxations with parental strain and a negative parent-child relationship quality exacerbating adjustment difficulties. These results support influential theoretical considerations on attachment, resilience, family stress, life course, and the importance of peer relations

(Benner & Mistry, 2020; Elder, 1998; Hay et al., 2004; Masarik & Conger, 2017; Thompson, 2000; Walsh, 2015) and have important implications for research and practice.

3.1 Child Psychological Adjustment During the COVID-19 Pandemic

The COVID-19 pandemic has been theorized to have a particularly strong impact in early and middle childhood as during this time period major social, cognitive, and neural developments unfold (Benner & Mistry, 2020). This thesis examined child adjustment during this period of the life span contributing invaluable insights to our theoretical and practical conceptions of how children cope with the quickly evolving COVID-19 environment.

3.1.1 Interdependence of Child and Caregiver Well-Being

Developmental theories point to the potentially adverse effects of disruptive sociohistorical events and contexts on the well-being of children and on parental and family functioning (Becker-Blease et al., 2010; Masten & Narayan, 2012). The experience of singular destructive events (e.g., natural disasters) or prolonged adversities (e.g., wars) can bear heavily on children and parents as they attempt to successfully navigate through a threatening and often unpredictable social upheaval. Findings from study 1 support these theoretical considerations in the context of the COVID-19 pandemic and show that during lockdowns parents and children experienced elevated stress levels, children's well-being declined, and restrictions on peer interactions constituted one of the most challenging aspects of the pandemic. This suggests that it is particularly the lockdown periods (Meier et al., 2020; Prem et al., 2020; Schuchat, 2020) that present children and parents with psychological challenges. In addition, study 1 shows that single parenthood and being an only child constitute risk factors for family psychological adjustment. This relates well to theoretical considerations that the effect of sociohistorical disruptions is attenuated or exacerbated by the specific vulnerabilities of children, parents, and the family as a system (Browne et al., 2015; Prime et al., 2020). It underscores the necessity of approaches to child developmental health that rely on a cumulative risk perspective linking proximal, family-specific risk factors to distal, societal risk factors that influence family interactions (Browne et al., 2015). Thus, the present thesis contributes to a cumulative risk approach to child adjustment in the context of the COVID-19 pandemic.

The contribution of study 1 to previous work is twofold. First, results from study 1 underscore and expand previous studies demonstrating the threat of sociohistorical disruptions for family functioning (Brooks-Gunn et al., 2013; Dybdahl, 2001; Kelley et al., 2010; Schneider et al., 2015; Yoshikawa et al., 2012). As such, the COVID-19 pandemic can be seen as comparable to previous societal disturbances in adversely affecting family functioning. Thus, results from study 1 advance our understanding of family functioning and risk factors in the context of adverse environments whereby the large sample size constitutes an advance to many previous studies allowing for the identification of a wider range of effect sizes. Second, the findings from study 1 relate well to previous work on family functioning in the context of the COVID-19 pandemic. Specifically, our findings add to notions of increased parental stress (e.g., Giannotti et al., 2021; Marchetti et al., 2020; Russell et al., 2022; Spinelli et al., 2020; Toppe et al., 2021) and decreased child well-being and increased child problem behavior (e.g., Bosch et al., 2022; Choi et al., 2021; Francisco et al., 2020; Hanno et al., 2021; Imran et al., 2020; Kurz et al., 2022; Mactavish et al., 2021; Meherali et al., 2021; Newlove-Delgado et al., 2021; Patrick et al., 2020; Sicouri et al., 2022; Tso et al., 2022; Yeasmin et al., 2020) during the COVID-19 pandemic and especially during lockdown periods. Thus, study 1 presents important evidence to further our understanding of lockdown related challenges on child and parental functioning and thereby supports notions identifying early and middle childhood as particularly important for theoretical and practical efforts in responding to the COVID-19 pandemic.

Over the course of the COVID-19 pandemic and especially during lockdowns, relations between parental and child variables have been proposed to play a decisive role in adjustment trajectories (Prime et al., 2020). But how are parental and child challenges in adjustment connected to each other? The present thesis claims their relation to be bidirectional. This claim relies on different theoretical avenues. The Parenting Stress Model (Abidin, 1992) and the Family Stress Model (Masarik & Conger, 2017) suggest that environmental adversity leads to increased parental stress, which in turn results in inadequate parenting practices and thereby in threats to child well-being. Developmental theories on attachment (Bowlby, 1969; Thompson, 2000), social-cognitive development in childhood (Lemerise & Arsenio, 2000), and developmental systems and peer relationships (Hay et al., 2004; Laursen & Hartup, 2002; Lerner, 2006), point to children's increased need of their caregivers during uncertainty, child social-cognitive limitation on autonomous responding to anxieties, and the importance of peer relations. From this theoretical point of view, caregiving demands increase during the COVID-19 pandemic and can lead to elevated

caregiver stress. Taken together, both paths constitute a bidirectional framework of parental and child adjustment.

Results from study 1 and study 2 support these theoretical claims. While parental stress predicted child well-being and problem behavior, the opposite also showed to be the case. Notably, we found these relationships cross-sectionally (during the lockdown) and longitudinally (from the lockdown to the period of loosened restrictions). One important finding indicated that changes in parental stress (from T1 to T2) predicted changes in child problem behavior and well-being (from T1 to T2). This relates well to previous work in the context of the COVID-19 pandemic showing that parental stress was related to child stress and child behavioral and emotional problems (e.g., Crescentini et al., 2020; Cusinato et al., 2020; Kim et al., 2021; Lionetti et al., 2022; Marchetti et al., 2020). Regarding the path from child difficulties to parental stress, our findings are among the first (see also Dubois-Comtois et al., 2021; Mazza et al., 2021) to point out this direction. Thus, bidirectional frameworks of child and parental adjustment have to be included in theorizing about effects of the COVID-19 pandemic on family functioning to a greater degree, especially since changes in one relate to changes in the other on a longitudinal level suggesting developmental bidirectionality.

The above has a number of theoretical and practical implications. First, the present work moves the field forward by demonstrating the fruitfulness of transactional accounts (Neece et al., 2012) in the context of the COVID-19 pandemic. This is especially important given the volatility of public health measures. It suggests that recovering from lockdown periods to relaxation periods can be beneficial to family functioning irrespective of whether the child, the caregiver, or both recover due to their reciprocal interconnectedness. Thus, bidirectional conceptualizations of child and caregiver difficulties and recoveries present a theoretical framework that promises to be very useful in furthering our understanding of family functioning during the pandemic. Second, these findings have practical implications as they open up avenues of interventions. That is, interventions directed at parent or child adjustment during the COVID-19 pandemic would have a double effect, namely, supporting children's or parents' own coping and thereby also being beneficial to the other respective party. For example, this theoretical framework would predict that reopening educational facilities and enabling peer interactions would lead to increased child well-being and thereby also increased caregiver well-being, even though caregiver COVID-19 related stressors themselves might not have changed markedly.

Taken together, the current thesis adds important evidence to a growing body of literature pointing to increased parental stress and increased child adjustment difficulties over the course of the COVID-19 pandemic and especially during lockdowns. Notably, the present work draws on a number of family and developmental theories to develop a transactional, bidirectional framework of reciprocity between caregiver and child adjustment difficulties (Neece et al., 2012; Prime et al., 2020). The results suggest that a bidirectional framework constitutes an important theoretical perspective advancing our understanding on the effects of the COVID-19 pandemic on child and family adjustment.

3.1.2 Parent-Child Relationship Quality as Protective Factor

Theories on child resilience in the context of social upheaval have allotted the parent-child relationship a crucial role in supporting child well-being and buffering against environmental risk factors (Masten, 2018; Prime et al., 2020; Walsh, 2015). Results from studies 2 and 3 underline resilience theory by demonstrating that the parent-child relationship quality moderated to what extent child problem behavior longitudinally affected parental strain and that it buffered against longitudinal increases in child adjustment difficulties. Thus, the present thesis extends previous findings on the protective role of the parent-child relationship quality (Hazel et al., 2014; Masten & Narayan, 2012; Miner & Clarke-Stewart, 2008; Papp et al., 2005; Qouta et al., 2008; Wickrama & Kaspar, 2007) by showing that the parent-child relationship quality also represents a key resilience factor in child and family adjustment during the COVID-19 pandemic. In addition, the current thesis contributes to emerging research in the context of the COVID-19 pandemic reporting beneficial effects of a positive parent-child relationship quality on child emotional and behavioral adjustment (Du et al., 2021; Nicolì et al., 2022) and on relations between parental and child emotional health (Bate et al., 2021). The present findings extend this work by indicating that the parent-child relationship can not only support child and family adjustment during lockdowns, but that it represents a promising resilience factor in how children psychologically adjust to the quickly changing COVID-19 related public health measures. Thus, the parent-child relationship quality constitutes an important protective factor in child psychological adjustment trajectories during the rapidly evolving COVID-19 pandemic.

Interestingly, the results of studies 2 and 3 suggest an effect of negative aspects of the parent-child relationship quality such as conflict and dominance but not of positive aspects such as intimacy and parental recognition of the child's activities and competencies (Furman & Buhrmester, 1985) on child psychological adjustment. That is, especially low

levels in the presence of conflicts, negative emotions, and child dominance in the parent-child relationship seems to represent a protective factor in child and family well-being. This expands previous work reporting effects of positive and negative aspects of the parent-child relationship quality moderating associations between parental and child emotional health during the first lockdown (Bate et al., 2021). Thus, our findings suggest that low negative interactive aspects of the parent-child relationship represent a protective factor that could take precedence over high positive interactive aspects with regards to child psychological adjustment.

One could consider at least two explanations for this pattern of results. First, research on the effects of the COVID-19 pandemic on child and family functioning indicates that children (e.g., Imran et al., 2020; Meherali et al., 2021) and parents (e.g., Giannotti et al., 2021; Spinelli et al., 2020; Toppe et al., 2021) first and foremost experienced increased stress and negative emotions in response to restrictive public health measures. These aversive experiences might especially bear on negative aspects of the relationship quality by increasing conflict and negative interpersonal emotions and ultimately compromising adjustment (Browne et al., 2015). Thus, if experiences during the pandemic particularly threaten to increase negative aspects of the parent-child relationship quality, it might subsequently be negative aspects rather than positive aspects that determine the effect of the relationship quality on child and family functioning.

A second explanation holds that the COVID-19 pandemic affects positive and negative aspects of the parent-child relationship quality similarly. That is, while negative aspects (e.g., conflict, negative emotions) increase, positive aspects (e.g., closeness, admiration) decrease. Recent work supports this proposition (e.g., Bate et al., 2021; Russell et al., 2020, 2020; but see Du et al., 2021). Increases in negative aspects thereby often constitute a direct rise in maladaptive strategies of communication (e.g., increased fighting and display of negative emotions towards each other). On the other hand, decreases in positive aspects represent more of an indirect, less salient reduction of positive interactions (e.g., parent appreciating child's activities and abilities to a lesser degree). Connecting the two, it follows that the parent-child relationship becomes increasingly characterized by negative interactive sequences repressing positive aspects, a tendency supported by increased demands on parents and their children to negotiate previously unproblematic topics (e.g., use of shared spaces, decrease of personal autonomy during home confinement; Prime et al., 2020). Thus, it might primarily be the extent to which parents and children engage in or refrain from maladaptive communication and negative emotions rather than the

decrease in positive interactions that dominates the parent-child relationship and subsequently affects child and family psychological adjustment during the COVID-19 pandemic.

Taken together, the parent-child relationship quality constitutes an important protective factor for child resilience during the unfolding COVID-19 pandemic (Masten, 2018; Prime et al., 2020; Walsh, 2015). Specifically, it supports longitudinal adjustment trajectories of child well-being and can diminish adverse effects of child problem behaviors on parental strain. The current thesis suggests that low negative rather than high positive aspects of the parent-child relationship could be particularly crucial in child psychological adjustment pointing to avenues of practical interventions aiming at reducing negative parent-child interaction sequences.

3.1.3 Child Adjustment Trajectories and Interindividual Differences

With the high volatility of the COVID-19 pandemic and its associated public health measures comes the question how trajectories of child adjustment could be best conceptualized. Life course theory (Benner & Mistry, 2020; Elder, 1998) and ecological systems theory (Bronfenbrenner & Morris, 2006) suggest that nonnormative sociohistorical disruptions affect distal and proximal environmental layers relevant to child development and can lead to adjustment difficulties evident as negative deflections in children's developmental trajectories (Almeida & Wong, 2009). The results from studies 2 and 3 support these theoretical notions by demonstrating that especially during lockdowns, child well-being decreased and child problem behaviors increased. Importantly, children recovered from these adjustment difficulties, except for family-related well-being, during periods of loosened restrictions. However, the present thesis also points to the necessity for a more fine-grained developmental theorizing about child adjustment trajectories. That is, (1) developmental trajectories and deflections need to be more clearly specified over the course of a sociohistorical disruption (e.g., the COVID-19 pandemic) and (2) developmental trajectories need to be differentiated by domain of adjustment.

Regarding the first point, results from studies 2 and 3 suggest that the COVID-19 pandemic does not have one main impact on child adjustment trajectories (e.g., one negative deflection in well-being and problem behaviors). Rather, over the course of the pandemic there seem to be multiple challenging periods for child adjustment coinciding with periods of strict public health measures (e.g., lockdowns). Thus, child adjustment trajectories can be conceptualized as wave-like with multiple negative deflections during strict public health

measures and multiple recovery phases in between (see also Raw et al., 2021). These findings relate well to longitudinal literature showing decreasing child well-being and increasing child internalizing and externalizing behavior from pre-pandemic to the first lockdown (Khoury et al., 2021; Vogel et al., 2021) with the opposite direction of effects from lockdown to loosened restrictions (Berry et al., 2021; Ravens-Sieberer et al., 2022). Importantly, the present thesis extends these findings by relying on a naturalistic quasi-experimental design and thereby overcoming methodological limitations of previous work. That is, the current thesis is among the first research projects to employ a methodological design allowing for stronger causal inferences that child adjustment difficulties represent specific lockdown effects rather than general developmental changes.

Regarding the second point, the differentiation of developmental trajectories by domain of adjustment, results from studies 2 and 3 suggest that there is no general trajectory (e.g., wave-like) describing children's adjustment during the COVID-19 pandemic. That is, while child emotional well-being and problem behaviors have followed a wave-like trajectory, child family-related well-being steadily declined over the first year of the pandemic. This resonates well with longitudinal studies conducted in Germany reporting a general negative trend in quality of life and worries about family and friends from lockdown 1 to lockdown 2 (Brandstetter et al., 2022; Ravens-Sieberer, Kaman, Erhart, Otto, et al., 2021). While family-related well-being seems conceptually connected to emotional well-being and problem behavior, this thesis suggests that it follows a steadily declining trajectory in contrast to a wave-like trajectory. This finding supports theoretical considerations highlighting the continued strain on families even during periods of loosened restrictions. That is, while, for example, peer contact was at least approaching pre-pandemic levels during loosened restrictions, many family-related stressors such as changes in working conditions, financial insecurity, increased demands to manage offline and online educational settings, negative expectations concerning future COVID-19 waves, and anxiety of getting infected, might not have reversed as easily and might have continued to put pressure on the family system and, consequently, on family-related well-being (Kupferschmidt, 2020; Lu et al., 2021; Müller et al., 2020). Thus, the present thesis advances our theoretical understanding of child adjustment trajectories by demonstrating that wave-like and steadily or asymptotically declining trajectories can coexist during the COVID-19 pandemic. On a practical level, this suggests that there should be different interventions by child adjustment domain. While, for example, families might need continued support throughout the pandemic irrespective of strict or loosened restrictions, reversing restrictions on peer

interactions during periods of loosened restrictions could contribute to child emotional well-being and decrease of problem behaviors.

The results of studies 2 and 3 demonstrated interindividual differences in child adjustment trajectories. Parental strain emerged as main predictor of children's emotional and behavioral recovery after the lockdown and of children's increasing emotional and behavioral difficulties going from loosened restrictions into the lockdown. Thus, the present findings extend previous cross-sectional work on the impact of caregiver stress on child behavioral and emotional problems during the COVID-19 pandemic (Crescentini et al., 2020; Kim et al., 2021; Li & Zhou, 2021; Lionetti et al., 2022; Marchetti et al., 2020; Morelli et al., 2020; Sun et al., 2022). Most importantly, parental strain clearly showed to increase or decrease the volatility of child adjustment in two directions, that is, the extent to which children recovered from a lockdown and the extent to which their well-being worsened going into a lockdown. This finding underlines theories conceptualizing parental stress as key factor in child adjustment during the pandemic (Prime et al., 2020). Thus, parental stress can constitute a risk factor exacerbating the negative impact of the COVID-19 pandemic on child psychological adjustment.

Taken together, the present thesis advances our theoretical understanding of child developmental trajectories during social disruptions. It presents novel insights demonstrating that child emotional well-being and problem behaviors follow a wave-like trajectory while child family-related well-being steadily decreases over the first year of the pandemic. In addition, parental stress emerges as a key factor greatly impacting increases and decreases of child well-being across multiple lockdowns. Thus, it is paramount to specify concrete adjustment trajectories and investigate differences between domains to get a more complete picture of child psychological adjustment during the COVID-19 pandemic.

3.1.4 Contributions to Theories on Child Socio-Emotional Development and to Theories on Child Psychological Well-Being

The present thesis advances theorizing on child socio-emotional development (e.g., life course theory, developmental systems theory) and theorizing on child psychological well-being and adjustment (e.g., resilience theory). Regarding theoretical frameworks of the life course (Elder, 1998) and of ecological systems (Bronfenbrenner & Morris, 2006), the present work suggests that it is paramount to conceptualize how micro-, meso-, and macrosystems change along the temporal dimension (i.e., chronosystem) and how these changes affect child adjustment trajectories. First, both theoretical frameworks conceptualize

sociohistorical changes in stratified societal systems to impact child developmental trajectories. The current thesis demonstrates the usefulness of a closer analysis of these sociohistorical changes. That is, do sociohistorical disruptions unfold as one temporally confined catastrophic event (e.g., natural disaster), do they unfold in waves of higher and lower adversity (e.g., COVID-19 pandemic), or do they unfold as continuous adversity (e.g., wars)? The answer to this question can constitute a valuable starting point in theorizing about child adjustment trajectories. For example, identifying periods of lower adversity during sociohistorical disruptions might be important with respect to possible recovery phases. Second, the present thesis suggests that theorizing about child developmental trajectories can benefit from including considerations about the domain specificity of effects. That is, sociohistorical disruptions might not result in one general impact on child well-being, but they might impact different domains of well-being differently. For example, individual aspects of well-being (e.g., emotional well-being, problem behavior) seem to show phases of recovery during the COVID-19 pandemic while relational aspects of well-being (e.g., family-related well-being) seem to not recover and rather decline continuously. Similar asymptotically declining trajectories might also describe child adjustment in sociohistorical disruptions of continuous adversity such as wars (Dybdahl, 2001; Masten & Narayan, 2012; Qouta et al., 2008). Thus, the present work underscores the usefulness of life course and ecological systems frameworks in furthering our understanding of the impact of adversity on child development (cf. Benner & Mistry, 2020). It contributes notions of a close analysis of sociohistorical changes as a valuable starting point in conceptualizing the impact of disruptions on child adjustment as well as notions of differentiated effects of adversity by child adjustment domain to these theories.

Social interactionist accounts and developmental systems theory (Lerner, 2006) stress the importance of social relationships and friendships for child socio-emotional development. The present findings demonstrate that children recovered in their emotional well-being and their problem behavior during periods of relaxation with markedly less restrictions on peer interactions and thereby underline these theories (e.g., Gifford-Smith & Brownell, 2003; Hay et al., 2004; Laursen & Hartup, 2002; Newcomb & Bagwell, 1995). That is, increased peer contact during periods of loosened restrictions likely played a major role in children's recovery after lockdowns. This also relates well to the finding that missing their friends and family constituted the most challenging aspect of the first lockdown for children. The present thesis contributes to the above theories by showing that peer interactions and friendships do not only foster child well-being and social development

during phases without specific sociohistorical disruptions, but also during large-scale societal disturbances. That is, cooperative, reciprocal interactions with peers seem to provide children with crucial emotional support in coping with grave uncertainty and environmental adversity. In other words, friendships can enable children to navigate social disturbances and recover from adjustment difficulties and therefore be conceptualized as important protective factor. Thus, social interactionist accounts can contribute important insights to resilience frameworks in the context of sociohistorical disruptions and the current work points to the fruitfulness of linking both theoretical frameworks. Specifically, resilience frameworks (e.g., Masten, 2018) often differentiate between individual resilience factors (e.g., attachment relationships, self-regulation, positive views of self) and family resilience factors (e.g., family cohesion, family routines, family flexibility). Following social interactionist accounts and findings of the current thesis, peer resilience factors (e.g., friendships, collaborative activities, shared experiences) could comprise a further dimension that would be interesting to investigate. Taken together, the present thesis contributes to social interactionist and developmental systems accounts by showing that positive effects of peer interactions on child well-being extend to circumstances of environmental adversity and by suggesting linkages to resilience theory.

Resilience frameworks constitute one of the most influential theoretical avenues in research on child development in the context of sociohistorical catastrophes (e.g., Betancourt & Khan, 2008; Cicchetti, 2010; Masten & Narayan, 2012; Pine et al., 2005; Prime et al., 2020). That is, research is investigating protective (e.g., parent-child relationship) and risk factors (e.g., parental stress) leading to interindividual differences in individuals' resilience defined as ability to withstand or recover in adverse environments (Masten & Narayan, 2012; Walsh, 2015). Our results suggest that parental stress negatively affects child well-being and problem behaviors, constituting a risk factor for child adjustment and thereby underscoring claims of resilience theory. The current work contributes to resilience theory by pointing to the bidirectionality of the above finding. That is, while parental stress represents a risk factor for child adjustment difficulties, at the same time child adjustment difficulties constitute a risk factor for parental stress and well-being. Thus, in the context of environmental adversity affecting the whole family system, the current thesis suggests that relations between risk factor and associated negative outcome can be bidirectionally conceptualized with the negative outcome possibly constituting a risk factor for another family member. Such a bidirectional approach can contribute to a more comprehensive picture of the effects of environmental adversity on child and family functioning. In addition, the present thesis

suggests that low negative aspects in the parent-child relationship (e.g., conflicts) constitute a protective factor for child well-being. This underlines notions of resilience theory on the importance of the parent-child relationship as protective factor (Masten, 2018). While research on resilience has assigned paramount importance to the parent-child relationship as protective factor, the present work suggests that in the context of the COVID-19 pandemic parental stress as risk factor might outweigh the parent-child relationship as protective factor in terms of effect size. That is, the negative effect of parental stress on child adjustment seems to be much larger in absolute terms than the positive effect of low negative aspects of the parent-child relationship quality. This result supports the Family Stress Model (Masarik & Conger, 2017) and suggests that parental stress might play a more central role in child resilience than the parent-child relationship during the COVID-19 pandemic. Thus, the present thesis underscores resilience theory and contributes a bidirectional perspective of risk factors and associated outcomes as well as an emphasis on parental stress as risk factor over parent-child relationship as protective factor to its theoretical framework.

3.2 General Theoretical and Methodological Implications

The current thesis offers a number of valuable contributions to the field of child development in the context of adverse sociohistorical disruptions. First, research on child adjustment to social catastrophes such as wars, natural disasters, and economic turmoil generally faces multiple challenges such as concerns about additionally burdening traumatized subjects, difficulties in accessing disaster sites and conducting research due to economic and political turmoil, and the challenge to conduct longitudinal work due to chaos and migration (Bonanno et al., 2010; Masten & Narayan, 2012). The unprecedented global spread of the COVID-19 pandemic and advances in digital data collection methods (e.g., via online questionnaires) have made it possible for research efforts in the context of the COVID-19 pandemic to overcome some of these challenges. In particular, the access to large samples became possible due to the COVID-19 pandemic affecting entire populations and longitudinal study designs could be implemented online thereby decreasing the demands on both, researchers and subjects, to become part of the research process. This enabled researchers to discover different effect sizes in their work and address developmental trajectories to a greater extent (cf. Wade et al., 2020). The present thesis thereby contributes to our conceptions of child development in the context of sociohistorical disruptions as it is characterized by a rigorous longitudinal design relying on a large sample. As one of the first

research projects, it demonstrates how children adjust over the course of the first year of the COVID-19 pandemic by relying on a naturalistic quasi-experimental design with four waves of data collection. Specifically, the present research suggests specific lockdown effects on child problem behavior and emotional well-being (wave trajectory), and continuous negative effects on child family-related well-being (declining trajectory). In addition, the large sample enabled the current work to differentiate smaller effects, such as parent-child relationship quality as protective factor, from larger effects, such as parental stress as risk factor. Thus, the present thesis advances the field methodologically and extends our theoretical understanding of child development in the context of sociohistorical disruptions.

Second, researching child and family functioning during the COVID-19 pandemic comprises a multidisciplinary endeavor aiming to open a window into how children and families cope with pandemic related societal changes and thereby providing avenues for theoretical and practical insights. The present thesis points to the fruitfulness of a developmental science approach to investigating child psychological functioning during the COVID-19 pandemic. That is, influential developmental theories such as attachment theory (Bowlby, 1969; Thompson, 2000) and theories on the developing importance of friendship and peer interactions in childhood (e.g., Gifford-Smith & Brownell, 2003; Hay et al., 2004; Laursen & Hartup, 2002; Newcomb & Bagwell, 1995) offer predictions on the core challenges children face during the pandemic (e.g., the need for attachment figures in times of uncertainty, the importance of peer interactions for socio-emotional development and coping with the pandemic). In addition, theories on child developmental trajectories within a stratified societal system (Baltes et al., 2006; Benner & Mistry, 2020; Bronfenbrenner & Morris, 2006; Elder, 1998) provide key frameworks within which developmental scientists construct theoretical perspectives on how child developmental adjustment could unfold during the COVID-19 pandemic. Thus, the present thesis presents the fruitfulness of a developmental science perspective within the multidisciplinary endeavor to investigate child adjustment during the pandemic.

3.3 Directions for Future Research and Conclusion

The present thesis points to a number of avenues for future research to further uncover child psychological adjustment during the COVID-19 pandemic. First, the current research relied on a single informant approach to enable data collection on a large sample within a short time frame given the volatility of COVID-19 related measures and to address the well-being

of preschoolers who are still socio-cognitively limited in their abilities to present a general evaluation of their well-being and behavioral changes. As educational facilities have reopened for the most part after the first year of the pandemic, future work should focus on teachers' reports on child adjustment as well as collect behavioral data from children to paint a more complete picture of adjustment processes. Second, given the importance of the parent-child dyad in the context of the COVID-19 pandemic, future research could collect interactional data of conversations between parents and children to see in which way both sides talk about changing circumstances and how these parent-child interactions subsequently affect parental and child well-being. Third, it would be interesting to investigate how child adjustment during the COVID-19 pandemic relates to children's coping with adverse situations later in their lives. That is, does child coping during the COVID-19 pandemic impact child coping with normative and non-normative disruptions and transitions at later life stages?

In conclusion, the present thesis is among the first work to provide a comprehensive window into the developmental interplay of parental stress, child well-being and problem behaviors, and the parent-child relationship quality during the first year of the COVID-19 pandemic in Germany. By relying on four waves of data collection, it demonstrates how parental stress and child well-being are reciprocally and longitudinally related, that the parent-child relationship constitutes an important protective factor, and that child adjustment trajectories can be wave-like or steadily decreasing depending on the domain. Thus, the current thesis advances our theoretical understanding of child development during the COVID-19 pandemic and provides important insights into the study of child adjustment to large-scale sociohistorical disruptions.

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<https://doi.org/10.1016/j.ecresq.2022.01.007>

Acknowledgments

Die Erstellung dieser Arbeit haben viele Menschen begleitet, denen ich hier herzlich danken möchte. Ein besonderer Dank gilt meinem Erstbetreuer Markus Paulus für die spannenden Projekte, den inspirierenden Austausch und die zahlreichen Schreibabenteuer. Vielen Dank ebenso an meinen Zweitprüfer Tobias Schuwerk für seine Unterstützung und an meine Drittprüferin Katrin Lohrmann. Zudem bedanke ich mich bei meinen Co-Autorinnen Natalie Christner und Astrid Hazzam für die gelungene Zusammenarbeit. Dem gesamten Lehrstuhl Team möchte ich herzlich für die aufschlussreichen Diskussionen und hilfreichen Ideen danken, von welchen diese Arbeit sehr profitiert hat. Danke auch an alle Studierenden, die zur Entstehung dieser Arbeit maßgeblich beigetragen haben. Zuletzt ein unschätzbare Dank an Theresa, Rebecca und Lenya Essler für ihre einzigartigen Denkanstöße, ideenreichen Gedanken und den zauberhaften Austausch.

Appendices

A Paper by Christner, Essler, Hazzam, & Paulus (2021) – Study 1

Christner, N.¹, Essler, S.¹, Hazzam, A., & Paulus, M. (2021). Children's psychological well-being and problem behavior during the COVID-19 pandemic: An online study during the lockdown period in Germany. *PloS one*, 16, e0253473. <https://doi.org/10.1371/journal.pone.0253473>

¹ shared first authorship

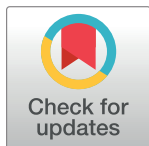
RESEARCH ARTICLE

Children's psychological well-being and problem behavior during the COVID-19 pandemic: An online study during the lockdown period in Germany

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Abstract

As COVID-19 dramatically changes human social life, restrictive lockdown periods to slow the spread of the virus have been suggested to particularly affect the psychological well-being of children and their families. To capture lockdown-related effects on a large scale, the present study used an online questionnaire completed by parents of 3-10-year-olds during the most restrictive lockdown period in Germany thus far ($N = 2,672$). Parents reported their stress level, their child's well-being, and their child's problem behaviors among others. Results showed that most parents and children experienced lockdown-related stress. Concerning children, not being able to meet with friends and family members outside the household emerged as the primary challenge. Older children (7–10 years) evidenced more emotional symptoms as well as less conduct problems and hyperactivity than younger children (3–6 years). Children's own and their parents' stress level, the degree to which children missed other children, and children's age all showed to be negatively related to children's general life satisfaction. Single parenthood and being an only child were associated with higher levels of child problems. Taken together, these findings shed light on the psychological well-being of children and their families during governmental lockdown measures, as well as on relations between children's coping and demographic background. They have implications for possible avenues for interventions, inter alia by encouraging policies that facilitate the maintenance of social relationships and focus particularly on children from single parent families, on only children as well as on families in challenging housing situations.

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Citation: Christner N, Essler S, Hazzam A, Paulus M (2021) Children's psychological well-being and problem behavior during the COVID-19 pandemic: An online study during the lockdown period in Germany. PLoS ONE 16(6): e0253473. <https://doi.org/10.1371/journal.pone.0253473>

Editor: Helena R. Slobodskaya, Institute of Physiology and Basic Medicine, RUSSIAN FEDERATION

Received: November 27, 2020

Accepted: June 6, 2021

Published: June 23, 2021

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Data Availability Statement: Data relevant for this study is openly available on OSF at <https://osf.io/9bj23/>.

Funding: This study was supported by a scholarship of the Claussen-Simon-Stiftung to SE.

Competing interests: The authors have declared that no competing interests exist.

Introduction

The pandemic caused by the SARS-CoV-2 virus bears an enormous challenge for societies worldwide. In order to slow down the infection rate, many communities arranged lockdowns that involved extensive restrictions of public life. Events and gatherings were cancelled, shops and recreational facilities were closed, and employees had to work from home, if possible. In addition, educational institutions such as schools and universities were closed and began to

move teaching online. Kindergartens and daycare centers only offered a reduced possibility of emergency child care for key workers (i.e., retail, health care system, banks, etc.). Later, emergency child care was expanded for single-parents. Besides these restrictions, governments recommend and enforce social distancing, that is, keeping physical distance from others, including friends and family members from different households. Hence, the COVID-19 pandemic massively curtails social interactions and public life.

Families are particularly affected by the contact restrictions and preventive regulations. First, parents' working situation changed, potentially resulting in additional concerns about financial security. Some are required to work short time, some have to work from home, and some struggle with the maintenance of their own business. Others have to keep up their work, facing the threat of interacting with potentially infectious people every day. On top of that, parents' responsibilities increased. Because most of the children had no access to kindergarten or school for weeks, they had to be taken care of the whole day, including teaching obligations. The accumulation of responsibilities thus likely constitutes a particularly stressful situation for parents and families [1]. The current study aimed to investigate the impact of the pandemic and associated restrictions on parents' and children's psychological well-being. In addition, we aimed to identify the major problems for children and factors that might attenuate the problematic consequences of the pandemic.

Following developmental theorizing, governmental restrictions should have a pronounced impact on young children. First, children are highly dependent on adults given their limited autonomy. That is, children rely on adults' support in everyday tasks but also for emotion regulative processes. Given parents' increased responsibilities, children might receive less or only inconsistent support. Second, young children might have problems to grasp the complexity of the situation and understand the massive changes in everyday life due to their limited cognitive abilities [2, 3], leading to perceived insecurity and lack of control. Third, due to their limited self-regulation and emotion regulation capacity [4, 5], children might be in special need for support in handling anxiety caused by the disruptive situation. The multitude of these conditions probably makes the situation particularly challenging for young children, which is hypothesized to lead to increased emotional and behavioral problems. First evidence during the COVID-19 pandemic supports this assumption [6–8].

A further line of reasoning leads to the assumption that health-promoting regulations caused by the COVID-19 pandemic had widespread effects on children's life. Governmental measures restricted multiple systems in which—considering a bioecological framework [9]—children's interactions are typically embedded, such as family, school, or daycare centers. As multiple systems are considered important to cope successfully with a challenging situation [10, 11], we have reason to assume that the pandemic-related regulations threaten children's well-being. While children faced a challenging situation, which would require a successful resilience system, most resilience systems were temporarily disrupted. Children's everyday life was concentrated on the family, likely leading to more pressure and stress within the family system.

First studies on the impact of the COVID-19 pandemic indeed evidence an increase of anxiety and depression symptoms among school-aged children [for review see 7]. In addition, research on previous pandemics revealed that disease-containment methods can have traumatizing effects. Following the Influenza-A-H1N1 pandemic, the proportion of children and parents meeting the clinical criterion for a posttraumatic stress disorder was higher in those who experienced isolation or quarantine compared to those who did not experience isolation or quarantine [12]. A review on the psychological consequences of quarantine in adults additionally highlights poorer mental health, increased fear, frustration, and a sense of isolation as consequences of quarantine [13]. The current study aimed to expand our understanding of

pandemic-related stressors and protective factors for parents' and children's psychological well-being by identifying major problematic topics and examining relations with demographic background.

Given the intense pressure on the family system, caregiver stress might be passed on to children. From an attachment theoretical perspective, children seek proximity to caregivers when exposed to stressful situations [14, 15]. Given the stressful situation caused by the pandemic, parents experience more stress and, as a result, might provide less support to children than required. This leads to the special situation that children's need for the presence and support of the primary attachment figure is heightened, while parents themselves face a stressful situation and hence struggle even more to meet the child's needs adequately. These challenges for child emotion regulation might pave the way for developmental psychopathologies [e.g., 16, 17]. Thus, even though parents spent more time with children, they had possibly more problems in reacting to their children appropriately.

Although the lockdown regulations affected the family system immensely, the situation might have not only been perceived as stressful. Beyond the negative consequences, families might have perceived positive outcomes. Parents got to spend more time with their children, which might have led to valuable parent-child interactions. The interpretation of the lockdown situation in positive or negative terms might relate to the condition and demographic background of the family. It remains thus an open question to which degree families experienced positive and negative consequences of the lockdown.

The pandemic-related restrictions inhibit personal interaction with friends or other children (except for children living in the same household). This might be particularly challenging for children's development, because peer relationships, particularly friendships, are important for several reasons. Friendships play an important role for children's well-being, they provide reciprocal assistance and support children's emerging emotion regulation abilities [18–21]. In addition, friendships offer children a context that is characterized by cooperation, prosocial behavior, and a strong affective tie [20]. For example, already preschoolers expect more sharing from friends than non-friends [22]. The lockdown-related isolation hinders direct interactions with friends. Particularly in younger children, friendship rests on joint activities such as playing together [23]. While older children might be able to maintain social exchange digitally, younger children are less capable in doing so. We therefore expect the contact restrictions to strongly affect children's well-being.

Next to the social consequences of governmental restriction, the pandemic itself constitutes a psychological challenge for children. Fear of getting infected and concerns about the well-being of close others are potential causes of distress. The general ability to have empathic concern for others' well-being emerges in the first years of life [24, 25]. In school years, children show anxiety about their own health [26, 27] and report fear of a novel disease, as evidenced during the Swine Flu pandemic [28]. These fears, particularly if not being adequately addressed by caregivers, could lead to maladaptive outcomes [17, 29]. It remains thus important to examine the degree to which children face a variety of concerns, in particular anxiety, in times of the pandemic.

Notably, the stressful situation might be detrimental for child well-being to such an extent that it relates to psychopathological outcomes. Developmental theories highlight the role of family or parental stress for the emergence of child problem behavior [30, 31]. A number of studies evidenced that parenting stress is associated with internalizing and externalizing problems in their children [32–34]. Because the situation caused by the pandemic is expected to be exceptionally straining for parents, changes in parenting behavior might in turn cause child problems [35]. In addition, anxiety of parents regarding the unpredictable situation might pave the way for internalizing disorders in children [36]. Examining children's problems in

times of the lockdown is thus of great importance to foresee potential psychopathological consequences of the governmental regulations for children.

While the considerations above suggest that the situation of the COVID-19 pandemic was particularly stressful for parents and children, it is possible that some families were less negatively affected than others, depending on the resources they had to cope with such a situation. For example, two-parent families might have been less affected than single-parent families. Single parents typically report more parental stress [37, 38], which—given reduced extra-familial resources during the lockdown—might have been even enhanced. The well-being of children with siblings might have been less affected than the well-being of only children because they had at least one other child to play with.

Current study

The current study investigated the psychological impact of the contact restrictions and lockdown regulations during the COVID-19 pandemic on families and, in particular, young children aged 3–10. We focused on this age range because young children are very sensitive to the way of caregiving and highly dependent on their parents, given little autonomy and limited cognitive and emotional resources to handle the situation, as proposed above. These considerations give reason to assume that they might be particularly vulnerable to the changing pandemic-related conditions. In addition, the study aimed to identify the main topics that were relevant for children during the lockdown to identify possible avenues of intervention.

For that purpose, we assessed families' situations during the most restrictive time of the COVID-19 pandemic (mid of April 2020) in an online study in a German sample. At the time of data acquisition, educational facilities and daycare centers were generally closed, only offering a minimal emergency child care for key workers. Meeting people from other households was prohibited and fined, and employees were mostly required to work from home, if possible. Temporary financial support was offered for parents, if they were not able to work because they had to take care of their child at home due to pandemic-related closing of institutions. Particularly single parents and families with low income were eligible for additional financial support. If required to work short-time, that is, being temporarily exempted from work and receiving a reduced payment because of the employer's economic situation, parents received a larger continued payment than people without a child. The conglomeration of restrictions, which massively affected family life, called for an investigation of how children and parents handle this exceptional situation. In order to reach as many families as possible, we created an online questionnaire that included, *inter alia*, measures of parents' and children's stress level during the lockdown, changes in children's quality of life, children's problem behaviors, the extent to which children missed or engaged in social relationships, and pandemic-related challenges that were considered most problematic during the lockdown. Overall, we expected children's quality of life to be negatively affected by the pandemic. Based on the theoretical considerations above, we predicted children's change in well-being to be related to their own level of stress, to parental stress, and to decreased interaction with friends. In addition, we expected children to show problem behaviors, particularly if being an only child, living in a single parent family, or living in limiting housing amenities. We controlled for parental education when examining these relations. Yet, one needs to be aware that this does not fully control for socioeconomic status, making it possible that some of the associations might be related to families' financial resources. In addition, we aimed to identify which topics were prevalent for children's stress level, e.g., being concerned about an infection of themselves or close others, missing the interaction with other children, or being constantly surrounded by a parent, which might result in more disputes at home. The prevalence of such concerns might depend

on the child's age. With increasing age, friendships become more important, but children might also understand better why they cannot see their friends, that they are not alone in this, and that this situation will pass. With increasing age, children might also better understand the threat of a virus and therefore be more concerned about infections. We assessed the importance of a variety of concerns to shed light on their relative prevalence in children.

Method

Participants

A total of 2,672 participants made up the final sample. An additional 549 participants were excluded from the final sample as they did not fully complete the questionnaire ($n = 474$) or reported on children outside of the age range from 3 to 10 years ($n = 75$). As some participants entered data for more than one child (see procedure), we had parental reports of 3,389 children for parts of the analyses. Participant recruitment took place by postings on (social media) websites, by directly contacting families affiliated with the lab through Emails, and by words of mouth. Importantly, data collection took place from the end of April until the beginning of May 2020 when the lockdown restrictions were strictest in Germany to capture the situation of families and children during the most challenging time of the pandemic. The demographic characteristics of the sample are displayed in [Table 1](#). Many participating families have a high socioeconomic status. Participants excluded due to incompleteness of responses did not differ from participants with complete responses with respect to their family status, single parenthood, and educational degree by more than 7 percentage points ((1) family status for complete vs. incomplete responders—married (80% vs. 76%), relationship & living together (13% vs. 18%), relationship but not living together (1% vs. 2%), divorced/separated, no relationship (4% vs. 3%), single (2% vs. 1%), widowed, no relationship (<1% vs. <1%); (2) single parenthood for complete vs. incomplete responders—no single parenthood (94% vs. 96%), single parenthood (6% vs. 4%); (3) Educational degree for complete vs. incomplete responders—university degree (50% vs. 46%), vocational training (23% vs. 30%), university of applied sciences degree (15% vs. 14%), professional academy (8% vs. 7%), master training (3% vs. 3%), no vocational degree (<1% vs. 1%)). In addition, participants could optionally enter their Email address for the purpose of taking part in a raffle of ten 50 € gift vouchers. The study was approved by the ethics committee of the Faculty of Psychology and Educational Sciences, LMU Munich, and constitutes the first report of an ongoing longitudinal project. Participants gave their online informed consent to taking part in the study.

Power analysis

We conducted a statistical power analysis in G*Power to calculate the required sample size. As there was no prior COVID-19-related research to rely on regarding the expected effect sizes and given the practical and theoretical importance, we aimed at detecting small to large effect sizes. Assuming $\alpha = .05$ and $\text{power} = .80$ in a multiple regression analysis with 8 predictors, the projected total sample size was approximately $N = 759$. Therefore, our objective was a final sample of greater than $N = 800$.

Materials

The online survey consisted of three parts: (1) demographics, (2) situation of the child during the COVID-19 pandemic and parental strategies, as well as (3) general measures of parental self-efficacy and parent-child relationship quality. The survey was completed by one parent. In the introduction of the survey, we asked participants that the parent who mainly cares for the

Table 1. Demographic characteristics of the sample.

Demographic Variable	Subcategory	Percentage
Family Status	Married	80%
	Relationship & living together	13%
	Relationship but not living together	1%
	Divorced/separated, no relationship	4%
	Single	2%
	Widowed, no relationship	<1%
Single parenthood	No single parenthood	94%
	Single parenthood	6%
Educational degree	University degree	50%
	Vocational training	23%
	University of applied sciences degree	15%
	Professional academy	8%
	Master training	3%
	No vocational degree	<1%
Current job status	Home office	44%
	Job outside of the home	18%
	Parental leave	18%
	Reduced working hours	6%
	No job	4%
	Exempted	4%
	Other	6%
Additional childcare hours		
For Mothers	5–6 hours	38%
	7–8 hours	38%
	3–4 hours	11%
	9–10 hours	9%
	0–2 hours	4%
For Fathers	5–6 hours	27%
	7–8 hours	26%
	3–4 hours	23%
	9–10 hours	8%
	0–2 hours	16%
State of residence	Bavaria	70%
	North Rhine-Westphalia	7%
	Baden-Wuerttemberg	6%
	Berlin	3%
	Other	<3%
Age child	3–6 years	67%
	7–10 years	33%
Educational institution child	Kindergarten	56%
	Elementary School	38%
	Pre-Kindergarten	5%
	None	1%

<https://doi.org/10.1371/journal.pone.0253473.t001>

child should complete the survey. In the context of the present study, we focused on a selection of measures and we will present these in the following.

Demographics. The demographic questions referred to information about the parent, the child, and the parental strain due to the COVID-19 pandemic. Concerning the parent, we

assessed age and gender, family and partner status (married, in a relationship and living together, in a relationship and not living together, divorced or separated without partner, widowed, single), gender of partner (if applicable), number of children in the household, federal state of residence, housing situation (apartment or house, with or without balcony, no, small or large garden), highest educational degree (without, vocational degree, professional academy, master training, (applied) university degree) of self and partner (if applicable), current job status (no job, parental leave, home office, job outside of the home, reduced working hours, exempted, other) of self and partner (if applicable), percentage of childcare work relative to other caregivers (e.g., 80% of childcare work of study participant when the other caregivers account for 20% of childcare work). Concerning parental strain due to the COVID-19 pandemic, one question assessed how many more hours the parent cares for the child on a daily basis. In addition, three questions assessed whether the parent is strained to a greater degree due to the pandemic (e.g., "I am more stressed out in the current situation than normally"; Cronbach's $\alpha = 0.91$). A five-point Likert scale ranging from 1 ("do not agree at all") to 5 ("totally agree") was used to record parental responses. Concerning the child, demographic questions assessed age, gender, and educational institution (kindergarten, school).

Situation of the child during the COVID-19 pandemic. *Child's strain.* One item assessed the degree to which children are stressed, irritated, or lonely with regard to the current situation on a 4-point scale ("To which degree is your child stressed, irritated, or lonely with regard to the current situation?"). The response scale ranged from 1 ("not at all stressed, irritated or lonely") to 4 ("considerably stressed, irritated or lonely").

Changes in quality of life. To assess how the shutdown during the pandemic affected the child, we adapted 12 items from the German translation of the 52-items KIDSCREEN Health-Related Quality of Life Questionnaire for Children and Adolescents [39]. We selected these specific items (see below) for three reasons. First, some scales were not applicable given social distancing during the lockdown (e.g., friends, school and learning, others). Second, some items of relevant scales were similar in wording and due to time constraints, we only included one item (e.g., "was in a good mood" but not "was happy"; "enjoyed life" but not "was satisfied with life"). Third, some scales were of more interest theoretically (e.g., feelings, general mood) and were thus included over others (e.g., physical activities and health). In the original version, the KIDSCREEN assesses children's quality of life at a single time point. For the current purpose, we adapted the items in order to measure quality of life relatively to the time period before the lockdown and in order to measure positive and negative changes likewise (e.g., increase or decrease in quality of life compared to time period before the lockdown).

To answer the KIDSCREEN, parents indicated on a 7-point scale how much more or how much less their child had positive emotions, moods, time for him-/herself and with his/her parents during the weeks of the complete lockdown as compared to before the pandemic. The response scale ranged from 1 ("clearly less") to 7 ("clearly more") with the middle category 4 denoting "no difference". The items were: (1) enjoyed life, (2) was in a good mood, (3) had fun (1–3 aggregated to scale "emotions"; Cronbach's $\alpha = 0.89$), (4) was sad, (5) felt so bad that s/he did not want to do anything, (6) was lonely (4–6 aggregated to scale "moods"; Cronbach's $\alpha = 0.78$), (7) was content (single item scale), (8) had time for her-/himself, (9) was able to do things s/he wanted to do in her/his free time (8–9 aggregated to scale "free time"; Cronbach's $\alpha = 0.42$), (10) felt that her/his parents had time for her/him, (11) felt fairly treated by her/his parents, and (12) has been able to talk to her/his parents when s/he wanted (10–12 aggregated to scale "family"; Cronbach's $\alpha = 0.72$). Due to its insufficient reliability, the scale "free time" was only used for descriptive purpose and excluded from the statistical analyses.

Social relationships. Five questions assessed how much the child missed his/her educational institution and friends, how often s/he asks about the reopening of kindergarten or school,

whether s/he plays with others from different households (friends, children from the neighborhood, family members, child attends emergency group in kindergarten/school), and whether s/he initiates contact to her/his friends in any other way.

Problem behaviors. To get a more detailed insight into the child's current behavior and well-being, we adapted three subscales (emotional symptoms, conduct problems, hyperactivity-inattention) of the Strengths and Difficulties Questionnaire [SDQ; 40]. Each subscale consists of 5 items and is answered on a 3-point scale (0 – “not true”, 1 – “somewhat true”, 2 – “certainly true”). Other subscales were excluded as they largely refer to interactions with other children, which were almost non-existent due to the lockdown. Given the circumstances, the remaining items also had to be adapted and shortened (e.g., remove references to behavior at school or towards other children, which was not applicable during the lockdown). In order to keep the item structure similar, and in order to avoid ambiguous item formulations (e.g., “Often unhappy, depressed, or tearful”), we decided to adapt all items and to create short versions as follows: emotions problems (“Often complains of headaches”, “Has many worries”, “Often unhappy”, “Nervous or clingy”, “Has many fears”; Cronbach's $\alpha = 0.78$), conduct problems (“Often has temper tantrums”, “Generally obedient”, “Often fights”, “Often lies or cheats”, “Steals from home”; Cronbach's $\alpha = 0.71$), and hyperactivity (“Restless, overactive”, “Constantly fidgeting”, “Easily distracted”, “Reflects”, “Sees tasks through to the end”; Cronbach's $\alpha = 0.65$).

Individual challenges. Moreover, to assess the greatest challenges of the child during the lockdown, we provided 14 choices with multiple answers possible (e.g., “Child cannot meet its friends regularly”, “Child is bored”, “Conflicts about media usage”).

Procedure

The online survey was hosted on Qualtrics and took participants approximately 15 minutes to complete. The instructions informed participants about the purpose of the study and participants agreed to data protection regulations.

Next, participants completed the three blocks of the survey in a fixed order. First, they completed questions on demographics and the strain experienced by parents during the lockdown. Second, they answered questions pertaining to the situation and well-being of the child and the parental strategies used. Third, they completed the parenting self-efficacy items and the parent-child relationship items. All questions were displayed as forced choice to minimize missing data. Throughout the survey, participants could navigate back and forth to change their answers if necessary.

In addition, participants had the opportunity to complete a shortened version of the survey for a second, third, fourth, and fifth child. This shortened version comprised four demographic questions (age, gender, educational institution, additional caregiving work because of the pandemic), the Kidscreen items and the problem behavior items as described above for the respective child (662 participants completed the survey for a second child, 54 participants completed the survey for a third child, and 1 participant completed the survey for a fourth child). At the very end, participants were thanked for their participation.

Data coding

Numbers were assigned to the verbal markers of the scales as described above. We recoded all reverse items (3 items of the Kidscreen, 3 items on problem behaviors). Sum scores/mean scores were calculated for the respective scales and used for analyses. Data relevant for this study is openly available on OSF at <https://osf.io/9bj23/>.

Data analysis

Sample sizes between analyses differ, because the questionnaire for a second, third, or fourth child of a family did not cover all variables. Therefore, some analyses focus only on one child per family ($N = 2672$) and some analyses focus on the total sample of children (possibly multiple children per family; $N = 3389$). In order to account for the large age range (3–10 years), we divided the sample for some analysis in children aged 3 to 6 years and children aged 7 to 10 years. This age split roughly represents preschool age and school age. In addition, we divided the sample for some analyses based on whether children come from a single parent family or no single parent family because single parents might be particularly burdened by contact restrictions. For these analyses, we excluded 30 children for whom it was unclear whether they come from single parent or not-single parent families (family status: “relationship but not living together”). Analyses were computed with R version 4.0.1.

Results

Stress of parents and children ($N = 2672$)

General stress level. Parents report to be more stressed than usual due to the current situation. 31% of the parents fully agreed with all three items that stated that the current situation is more challenging and stressful than usual. The frequency of parents' mean rating across the three items about their stress level is displayed in Fig 1A.

The majority of children (>50%) were also reported to be rather or clearly stressed, irritated, or lonely with regard to the current situation (see Fig 1B). The mean level was identical for younger ($M = 2.64$, $SD = 0.85$) and older children ($M = 2.64$, $SD = 0.85$).

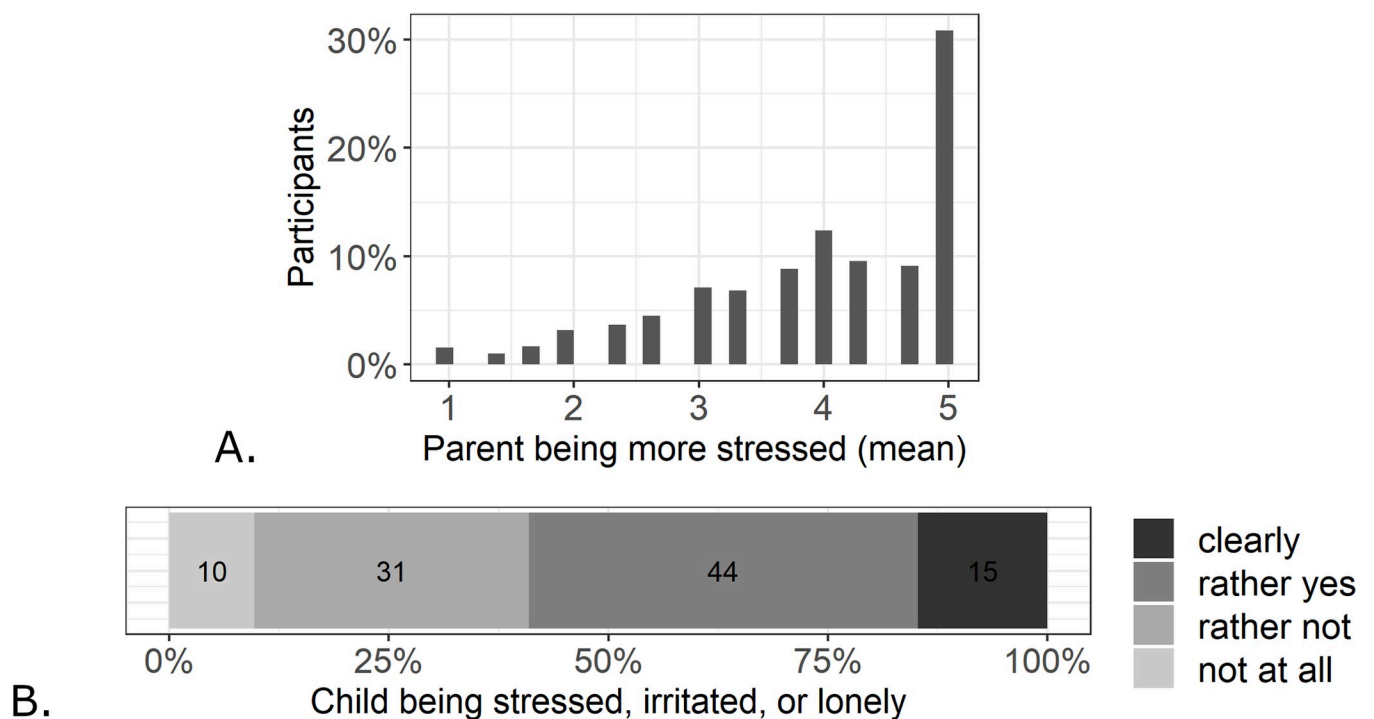


Fig 1. A: Percentage of parents' mean ratings on items regarding current stress. B: Percentage of children who are reported to be stressed, irritated, or lonely with regard to the current situation.

<https://doi.org/10.1371/journal.pone.0253473.g001>

Reasons for stress in children. The frequency of topics that are reported as being stressful for the child are displayed in Fig 2. For both preschool and school-aged children, the most prevalent topics are that they cannot meet their friends and other family members anymore. Particularly for school-aged children, disagreements about schoolwork or other duties and the lacking possibility of engaging in hobbies or sport are also reported frequently. Interestingly, what seems to be least problematic is children's own fear of getting infected.

Social relationships of children ($N = 2672$)

Due to the state-ordered restrictions, children were not able to visit (pre)school. Indicators of how much children miss their (pre)school and friends are displayed in Fig 3. The majority of preschool and school-aged children asked always, sometimes, or often when their preschool or school will open again ($> 60\%$). The mean level was comparable in younger ($M = 3.08$, $SD = 1.26$) and older children ($M = 3.05$, $SD = 1.17$), $t(2670) = 0.62$, $p = .533$. In particular, more than 70% of parents indicate that their child misses other children or friendships clearly or strongly. This was stronger in older ($M = 4.15$, $SD = 0.92$) compared to younger children ($M = 3.98$, $SD = 1.01$), $t(2670) = -4.07$, $p < .001$.

Contacts outside of the household ($N = 2627$)

In order to examine children's contacts outside of the household, we asked whether children played with others from different households (friends, neighbors, family members, attends emergency childcare groups) or whether nothing applied (multiple responses possible). For the following analysis, we excluded 15 children whose parent replied inconsistently to the question (selecting both "nothing applies" and one of the other response options). Overall, a number of families reported that their child played occasionally with friends (15%), neighbors (28%), or family members living in a different household (13%; see Fig 4). Independent of

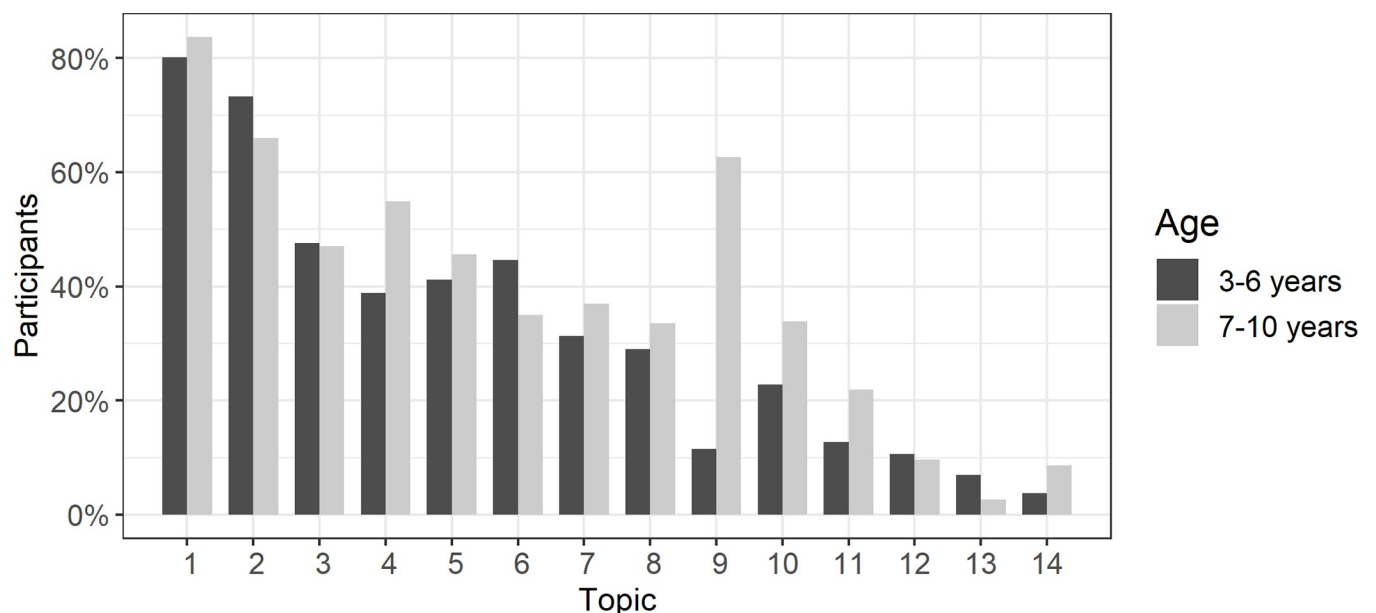


Fig 2. Reasons for the child being stressed, irritated or sad split by the child's age. Topics: 1) Child cannot meet its friends regularly. 2) Child cannot meet other family members (e.g., grandparents). 3) Child is bored. 4) Child cannot engage in hobbies/sports. 5) Conflicts about media usage (e.g., mobile phone, computer, tablet). 6) Me or my partner are more irritable than usual and sometimes overreact. 7) More disputes with siblings. 8) Child cannot leave the apartment/house as he/she wants to. 9) Conflicts about doing schoolwork or other duties. 10) Conflicts about keeping a daily routine. 11) Concern that other people might get sick. 12) Child is constantly surrounded by one parent at home. 13) Others. 14) Concern about getting sick oneself.

<https://doi.org/10.1371/journal.pone.0253473.g002>

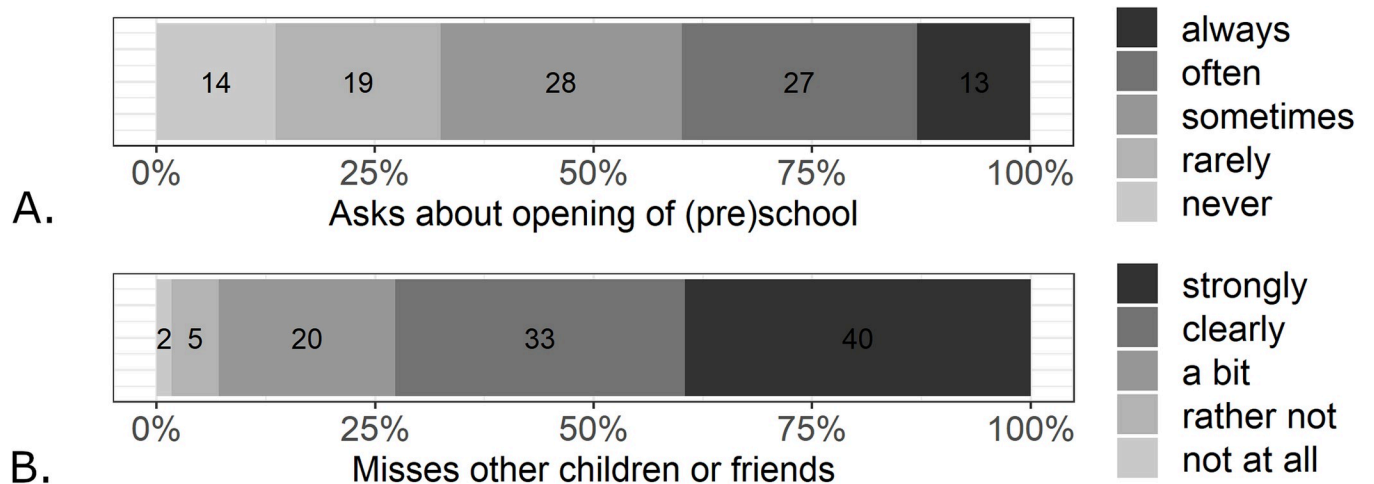


Fig 3. A: Frequency of children asking about the opening of their (pre)school. B: Intensity of children missing other children from their (pre)school or other friendships.

<https://doi.org/10.1371/journal.pone.0253473.g003>

single parenthood, playing with neighbors was reported most often, if any answer was applicable. Particularly single parents reported that their child played with other family members.

Children's problem behaviors (N = 3352)

We examined children's problem behavior on three dimensions: emotional symptoms, conduct problems, and hyperactivity/inattention. In particular, we compared problem behavior between children coming from single parent ($n = 197$) and not-single parent families ($n = 3159$), and between only children ($n = 651$) and children with siblings ($n = 2738$). The mean sums across children on each subscale are displayed in Fig 5. We computed a multiple linear regressions for each scale, addressing the relation between coming from a single parent family or not and between being an only child or not and each problem behavior. We controlled for the age of the child, gender of the child, parental educational degree, and housing

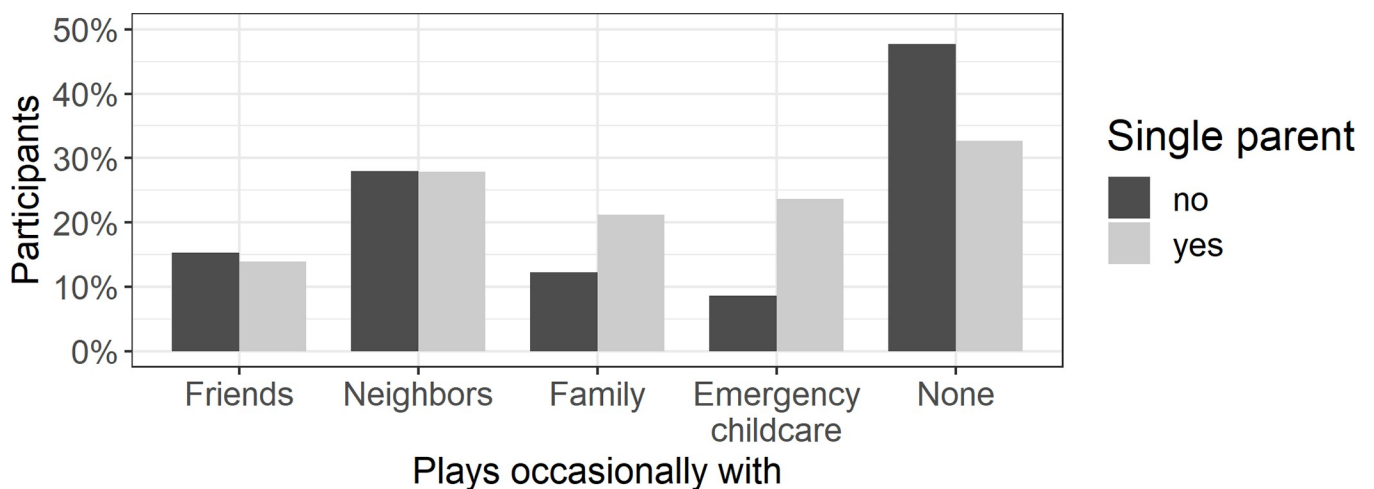


Fig 4. Percentage of parents reporting that their child plays occasionally with friends, neighbors, family members who lived in a different household, that their child occasionally visits the emergency childcare, or that nothing of the aforementioned applies. The percentages are split for single parents and non-single parents.

<https://doi.org/10.1371/journal.pone.0253473.g004>

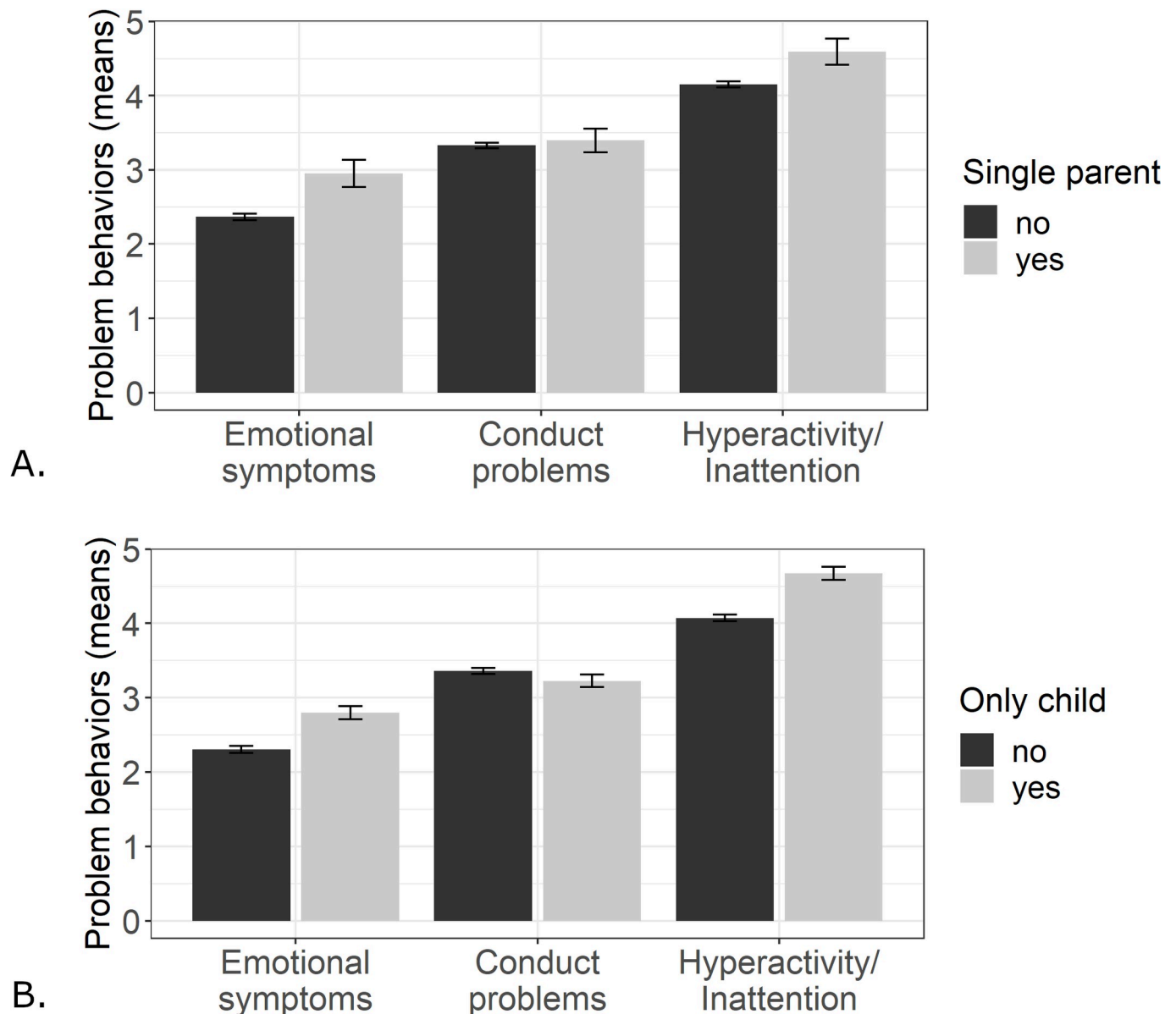


Fig 5. Means of problem behavior on each subscale across children. A: Children divided by their family background (single parent; not-single parent). B: Children divided by their sibling status (only child; not-only child).

<https://doi.org/10.1371/journal.pone.0253473.g005>

situation (apartment/house, balcony, small garden, large garden) by adding these variables as separate predictors. For these regressions, we excluded 10 children of diverse gender or for whom gender was not reported and 27 children whose caregiver replied ambiguously about their housing situation. The results of the regressions are presented in [Table 2](#). Children from single parent families showed more emotional symptoms compared to children from not-single parent families. Likewise, only children showed more emotional symptoms and hyperactivity/inattention than children with siblings. Less hyperactivity/inattention was reported for children living in a house ($M = 4.01, SD = 2.29$) compared to children living in an apartment ($M = 4.38, SD = 2.33$). Children, who had a large garden at home, showed less hyperactivity/inattention ($M = 3.93, SD = 2.27$) and less conduct problems ($M = 3.23, SD = 2.10$) compared

Table 2. Linear regressions on children’s problem behavior.

	Emotional symptoms		Conduct problems		Hyperactivity/Inattention	
	β	p	β	p	β	p
Age	.05**	.004	-.11***	.000	-.08***	.000
Gender	.04*	.037	-.05**	.002	-.12***	.000
Parent education	-.07***	.000	-.09***	.000	-.13***	.000
House	-.01	.602	-.04 ⁺	.068	-.05*	.031
Balcony	-.03	.140	-.03 ⁺	.091	-.04 ⁺	.050
Small garden	.00	.854	-.03	.149	-.02	.293
Large garden	-.02	.413	-.05*	.046	-.07**	.001
Single parent	.04*	.034	.02	.394	.03	.111
Only child	.08***	.000	-.05**	.007	.07***	.000
R^2, p	.02***	.000	.02***	.000	.05***	.000

Note. Gender: 0 = male, 1 = female. Parent education: 1 = none, 2 = vocational training, 3 = professional academy, 4 = master training, 5 = university of applied sciences degree, 6 = university degree. House: 0 = apartment, 1 = house. Balcony, small garden, large garden, single parent, only child: 0 = no, 1 = yes.

- ⁺ $p < .10$
- * $p < .05$
- ** $p < .01$
- *** $p < .001$.

<https://doi.org/10.1371/journal.pone.0253473.t002>

to children without a large garden (hyperactivity/inattention: $M = 4.32, SD = 2.33$; conduct problems: $M = 3.38, SD = 2.15$). Parental education related negatively to all aspects of children’s problem behavior.

Changes in children’s quality of life ($N = 3389$)

Fig 6 displays changes in children’s psychological well-being, moods and emotions, free time, family life, and children’s general satisfaction. A score of 4 indicates no change in comparison

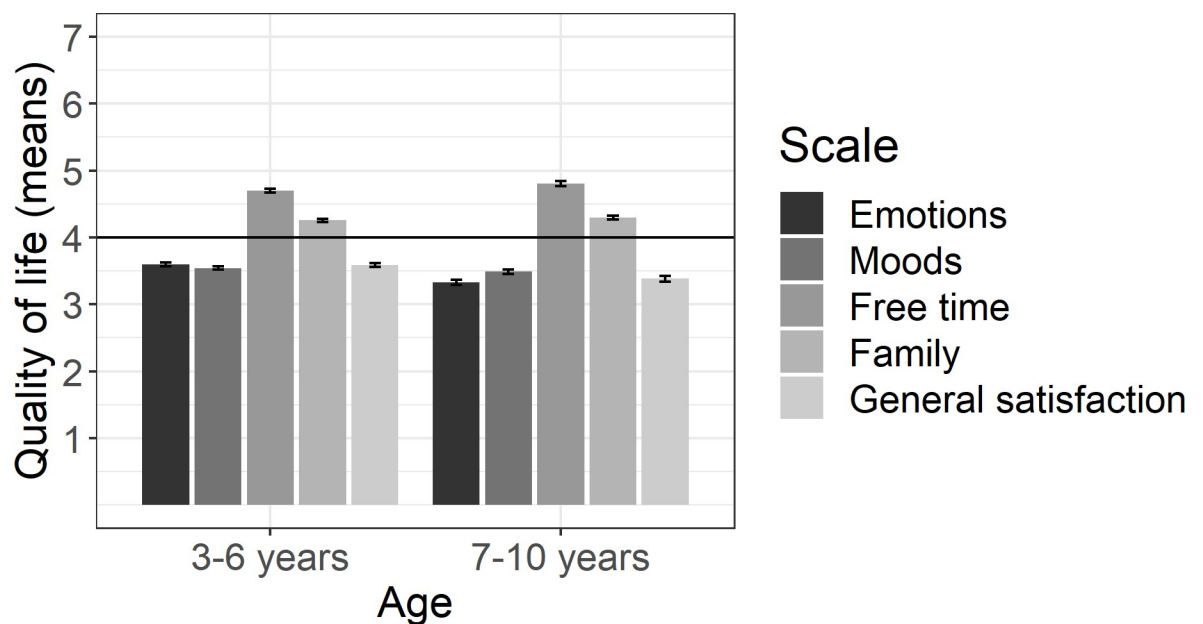


Fig 6. Changes in children’s situation in comparison to the situation before the pandemic and the associated restrictions split by children’s age. Error bars represent standard errors.

<https://doi.org/10.1371/journal.pone.0253473.g006>

Table 3. Linear regressions on children's general satisfaction.

	General satisfaction	
	β	<i>p</i>
Age	-.04	.004
Stress level	-.39	.000
Parental increase in stress	-.19	.000
Missing other children	-.19	.000
Contact to others	-.01	.514
R^2 , <i>p</i>	.42	.000

Note. Contact to others: 0 = no, 1 = yes (any of playing with friends, neighbors, family members outside household, emergency childcare).

<https://doi.org/10.1371/journal.pone.0253473.t003>

to the situation before the pandemic and the associated restrictions. We computed one-sample t-tests to compare means on each scale against 4. On the one hand, children's emotions, moods, and their general satisfaction turned lower or more negative since the start of the pandemic and the associated restrictions, $ps < .001$, ds range from 0.35–0.41. On the other hand, children's free time and family life turned more positive, $ps < .001$, ds range from 0.24–0.54.

We computed a multiple linear regression on children's general satisfaction in order to investigate which factors mainly contribute to children's well-being ($N = 2672$). For that purpose, we considered children's age, children's stress level, parental increase in stress level, children's missing of other children or friends, and whether children had contact to people outside the household as predictors. Table 3 presents the regression results. Children's general satisfaction related negatively to children's stress level, parental stress level, and the level children missed other children or friends. In addition, the results show a small relation between children's age and general satisfaction. With increasing age, children were less satisfied.

Discussion

The present study aimed to uncover the situation of children and their families during the most restrictive lockdown period of COVID-19 thus far. By means of an online questionnaire, parents reported on their own and their children's well-being, stress experiences, and demographic characteristics. Results showed that the majority of both, parents and children, experienced lockdown-related stress. For children, not being able to meet with friends and family members outside the household presented the most challenging aspect of the lockdown. Older children evidenced more emotional symptoms as well as less conduct problems and hyperactivity than younger children. Single parenthood and being an only child were associated with more child problems. These findings highlight the effects of lockdown measures on families during COVID-19 and add to the growing body of studies showing similar findings in different countries [41–43].

Our findings highlight family challenges during the lockdown. In detail, parents reported more hyperactivity and conduct problems for younger as compared to older children. One should be aware that our results could mirror normative age-related changes. Previous research has shown normative age-related decreases in hyperactivity and conduct problems for girls and increases in emotional symptoms for boys and girls [44]. Given that we lack a direct comparison with the situation before the lockdown, we cannot quantify to which extent the difficulties reflect normative age-related changes and to which extent they are related to the pandemic restrictions. Considering a relevance of the restrictions, age differences might be related to the yet limited self-regulative capacities of younger children [5]. Younger children might have been especially challenged by adapting to a less structured life at home, as

preschools could rely less on online teaching than schools and many parents were highly involved in restructuring their professional duties. Notably, older children showed more emotional problems than younger children. It is possible that older children might have been more emotionally challenged by the absence of their friends, who play an important role in the emotional well-being and regulation in middle childhood [20, 21]. Although we need to be cautious in our interpretation of this set of variables, they offer an overview on the challenges with which families had to deal and they provide the background for the interpretation of children's and parents' stress during the lockdown period.

Importantly, limited or non-existent contact with other children, friends, and the extended family seems to be one of the most critical factors for children's stress during the lockdown. This becomes evident on multiple layers. Parents reported missing other children and family members as the main reason for children's stress and indicated that the majority of children frequently asked about reopening of (pre)school. The seriousness is further underscored by one third of parents reporting that their child occasionally played with children from other households, thereby violating governmental policies. These findings speak to theories highlighting the importance of the mesosystem (extended family, peers, neighbors etc.) for child well-being [9]. They also underline theoretical considerations about contacts outside the core family as a resilience factor [45] and point to peer relationships as a crucial factor in children's abilities to cope with social upheaval induced by COVID-19.

With regard to sociodemographic factors, the current findings reveal a negative relation between parental education level and all aspects of child problem behaviors. Previous research on this relation provides mixed evidence, with some studies showing negative relations between maternal or paternal education and child problem behaviors [46–48], and others suggesting only a relation with hyperactivity/inattention [49] or no relation with changes in externalizing or internalizing behaviors across middle childhood [50]. While the current study suggests that particularly children of parents with relatively lower education expressed problems, these findings might partly reflect a general pattern, irrespective of the pandemic.

Another finding suggests that single parenthood is associated with children's well-being during the lockdown, especially concerning children's emotional state. However, as previous research revealed that children from divorced families generally show more internalizing and externalizing behavior problems [51, 52], we have to be cautious in attributing these differences particularly to the lockdown situation. Nevertheless, these findings highlight the special challenge for single-parent families. This becomes also evident in the finding that particularly children from single parents met family members from different households. Due to the very limited access to extra-familial resources, such as caretaking arrangements and interactions with friends or neighbors during the lockdown, single parents might have been faced with greater challenges concerning childcare, financial insecurity, or workplace reorganization than not-single parents. In addition, as findings indicate that single parents in general experience more stress than two-parent families [37, 38], this might have made them more vulnerable during the lockdown in the first place. Thus, our study suggests that targeting single parents during COVID-19 related measures could be a promising avenue for interventions to ensure child and family well-being. For example, one could argue that children of single parents should be prioritized in the allocation of emergency child care slots.

Beyond single parenthood, sibling status was related to child problems during the lockdown. Compared with children having siblings, only children have been reported to show more emotional and hyperactivity problems but less conduct problems. Previous research suggests that only children and children with siblings do not differ in means of adjustment or mental health [53, 54]. We might thus conclude that only children show increased emotional and hyperactivity problems compared to children with siblings particularly in the lockdown

situation. If one considers this finding along with the finding that the most stressful aspect of the lockdown was for children to not meet friends and extended family, only children could have experienced a culmination of social isolation. That is, while children with siblings might have been able to compensate for their absent friends by engaging more intensively with their siblings, only children were devoid of any peer contact. Thus, sibling status seems to be associated with child well-being as far as social distancing measures are concerned.

A further factor that relates to children's problem behaviors is their housing situation. Particularly the availability of a balcony or a large garden seems to be negatively linked with hyperactivity and conduct problems. Living in a house compared to an apartment seems to be linked with less hyperactivity. Research on housing characteristics and well-being suggests that children's problem behaviors generally relate to housing quality [55] and housing type (high-rise-dwelling vs. low-rise- or house-dwelling, [56]). Other studies on housing situations report neighborhood effects with increased externalizing problems in children living with low-SES neighbors [57]. Since we lack a systematic comparison with the situation before the lockdown, we have to be cautious in concluding that relations between housing characteristics and problem behaviors are specific to the pandemic. Moreover, it is possible that these relations are attributable to families' financial situation. We did not control for parents' socioeconomic status, only for parental education, which can serve as one indicator thereof [e.g., 48, 58]. Therefore, associations with household amenities may pick up relations between family financial resources and child problems.

Apart from identifying factors that relate to children's well-being, our results suggest that the lockdown has not only negative consequences for children and their families. Specifically, children were reported to have more family satisfaction than before the pandemic. During the lockdown, children may have valued the additional time spent with their parents, which possibly led to more family satisfaction. That is, if the family system had enough resources, children and parents could meaningfully engage with one another apart from external social duties. This positive consequence might have been especially pronounced if parent-child relationship quality was high at the beginning of the pandemic. Thus, our findings suggest that there may be positive side-effects of the lockdown. We have to leave it to future research to study these effects in more detail.

The current findings allow for some policy implications. As outlined above, the reduced possibility to meet friends and family members emerged as a dominant factor for children's well-being. Although social distancing measures are required for slowing the spread of the virus [59], these findings suggest that policy measures should try to facilitate social relationships nevertheless. Allowing to meet other children and family members in compliance with hygiene regulations might be a suitable strategy to balance children's need for social contact, parents' need for external support, and pandemic-related preventive measures. Beyond that, the findings encourage policy measures that focus particularly on children from single parent families, only children, and children from constrained household amenities. Because higher levels of problem behaviors are reported, offering the limited number of emergency child care slots for these children might be a beneficial strategy.

Limitations and conclusion

Although our study contributes to our understanding of the psychological context as well as the consequences of the pandemic for young children, it also comes with a number of limitations. First, we relied on parental report measures to get insights into the family dynamics during the COVID-19 pandemic. These might be particularly limited to assess children's emotional experiences. While there were few other options for large-scale data collection

during the lockdown, as personal contact was prohibited, future research should employ more direct methods to assess children's behavior and experience during these challenging times. Second, our sample constitutes a convenience sample in which parents of high socioeconomic status are overrepresented, which decreases the external validity of the present study. This sample bias might result from the online questionnaire format, which requires an environment with technical devices and good internet access. Although there are also a number of families from low socioeconomic background, more research is needed to more accurately determine pandemic related effects across the socioeconomic scale. Moreover, as we did not control for families' socioeconomic status, relations between child outcomes and household amenities may pick up relations with families' financial resources. Third, our study is limited to the age range from young to middle childhood. It would be very insightful to see how older children and adolescents were able to cope with the pandemic and which different difficulties emerge across the span of childhood and adolescents. Fourth, the current study examined one time point during the pandemic. As a direct comparison with the situation prior to the pandemic is lacking, we cannot determine to which degree relations of demographic variables with problem behaviors and well-being are specific to the pandemic. In addition, longitudinal studies that examine parents' and children's well-being on several time points are needed to understand long-lasting effects of the lockdown measures and longitudinal relations between parent and child well-being.

Taken together, our study documents the psychological well-being and problems of children and families during the strictest COVID-19 related lockdown so far. In particular, both parents and children experience high levels of stress, with parental stress constituting one avenue to the reported internalizing and externalizing problems in children. While several demographic variables seem to relate to how families and children cope with the pandemic, the most important ones seem to be parent status (single, not single parent) and sibling status (only child, not only child). With social isolation as the major factor in children's pandemic-related stress, there also seem to be singular positive effects regarding family life. Thus, our study can speak to public policy measures and interventions targeting family well-being during the unfolding COVID-19 pandemic.

Acknowledgments

We thank all parents for participating in this study.

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B Paper by Essler, Christner, & Paulus (2021) – Study 2

Essler, S.¹, Christner, N.¹, & Paulus, M. (2021). Longitudinal Relations Between Parental Strain, Parent–Child Relationship Quality, and Child Well-Being During the Unfolding COVID-19 Pandemic. *Child Psychiatry & Human Development*, 52, 995-1011. <https://doi.org/10.1007/s10578-021-01232-4>

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Longitudinal Relations Between Parental Strain, Parent–Child Relationship Quality, and Child Well-Being During the Unfolding COVID-19 Pandemic

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Accepted: 6 August 2021
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Abstract

As COVID-19 sweeps across the globe, scientists have identified children and families as possibly particularly vulnerable populations. The present study employed a developmental framework with two measurement points (the first at the peak of the lockdown restrictions ($N=2,921$), the second after restrictions had been majorly loosened ($N=890$)) to provide unique insights into the relations between parental strain, child well-being, and child problem behavior. Cross-lagged panel analyses revealed longitudinal effects of child well-being and problem behavior at T1 on parental strain at T2 with parent–child relationship quality as a moderator. True intraindividual change models showed that decreases in parental strain between measurement points predicted increases in child well-being and decreases in child problem behavior. Thus, the present research points to parental stress coping and child emotional adjustment as promising avenues for professionals and policy makers in their efforts to ensure child and family well-being throughout the pandemic.

Keywords COVID-19 · Parent–child relationship quality · Parental strain · Child well-being · Child problem behavior

Introduction

The unprecedented spread of COVID-19 across the globe has had a previously unimaginable impact on human social life in virtually every country and society. From the dramatic changes of human social interactions on the micro-level to economic turmoil on the macro-level, there is almost no societal subsystem unaffected by the COVID-19 pandemic. As governments across the world have taken drastic public health measures to contain the spread of the virus, different demographic groups have faced different degrees of COVID-19 related challenges. Many politicians, professionals, and scientists have identified children and families to be among the arguably most heavily affected groups [e.g., 1, 2]. As many parents had to reorganize their work processes and switch into home offices while public education for children

of all ages came to a sudden standstill in many countries, families and children could be considered one of the melting pots of the unfolding pandemic. Given the volatility of COVID-19 related societal developments and measures (e.g., closure and reopening of educational facilities, changing public health strategies based on current infection numbers), it seems paramount to investigate how the impact of COVID-19 pandemic policies on children and families changes across the span of the pandemic [e.g., 3]. Thus, the aim of the current study was to uncover the dynamics in children's and families' well-being and challenges during the pandemic. To this end, the present study investigated changes in children's well-being and problem behavior during the pandemic and their relation to parental strain. One key question concerns to which extent potential relations between child well-being and parental strain are moderated by the general quality of the parent–child relationship. Importantly, the current study employed a longitudinal approach. Given that most research to date exploring the impact of the COVID-19 pandemic on children and families relied on cross-sectional designs [e.g., 2, 4, 5; for an exception see 6], little is known about the dynamic changes in the relations between child well-being and parental strain

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between different phases of the pandemic. Our study aimed to close this research gap.

Notably, developmental theorizing suggests that the public health-related measures taken by governments to slow the spread of COVID-19 will have a pronounced impact on children's well-being. Clarifying this impact, understanding aggravating and mitigating factors, and learning about potential relations to child and parental social functioning will give crucial information in ensuring child well-being in the further phases of the pandemic to come. From a bioecological perspective [7], child well-being and adjustment relies on proximal as well as distal social factors [see also 8]. As the COVID-19 pandemic heavily impacted distal (e.g., social disruptions such as the far-reaching lockdown of social life) as well as proximal (e.g., drastic reduction of social interactions with peers, teachers, or grandparents during the lockdown) layers, one would assume negative effects on children's emotional well-being. This prediction is especially underscored by research showing that children's interactions with social agents beyond the core family constitutes an important resilience factor [9]. In addition, children, especially during early and middle childhood, depend heavily on their caregivers due to their emerging but yet limited cognitive [e.g., 10], self-regulative [e.g., 11], and social-emotional [e.g., 12] capacities. That is, children might not fully understand the pandemic as the cause of the dramatic changes in their lives, they might experience strong emotional reactions such as anxiety concerning their own possible infection and that of close others, and they might be in exceptional need for (external) self-regulatory resources in order to navigate the disruptive situation at hand. First evidence shows that especially during the initial phase of the pandemic, parents reported children's disturbed sleep patterns, more-challenging bedtime routines, and children's decreased sleep quality [6]. A recent review on the COVID-19 pandemic's impact on the mental health of children and adolescents underscores this point by reporting high rates of anxiety, depression, and post-traumatic symptoms among children [13]. Thus, understanding the impact of COVID-19 related policies directly speaks to the relevance of a bioecological perspective on child development. Taken together, it is important to investigate the developmental dynamics of children's well-being during the ongoing COVID-19 pandemic. To assess the unfolding developmental dynamics, the present study employs a wide range of indicators of child well-being and problem behavior at two measurement points (the first at the peak of the lockdown restrictions, the second after restrictions had been majorly loosened) during the pandemic.

Influential developmental theories on child-caregiver interactions [e.g., 13, 14; for reviews see 15, 16] have proposed that especially young children require the availability of their caregivers as well as sensitive caregiving during

challenging phases [e.g., 17, 18]. That is, as children might experience negative arousal (e.g., insecurity, anxiety, disorientation) during social upheaval caused by the COVID-19 pandemic, they rely on their caregivers to help them regulate their emotions, to support them in understanding the current situation according to their cognitive capacities, and to anticipate and react adequately to their needs [e.g., 13, 14, 19]. It is well established that sensitive and responsive caregiving is related to children's socio-emotional development and self-regulation skills [e.g., 20–23]. In the context of the COVID-19 pandemic, this leads to the paradoxical situation that especially while children's need for caregiver availability increases during the COVID-19 crisis, caregivers themselves are also experiencing unprecedented strain. That is, many caregivers are under intense pressure to manage new working situations (e.g., home office, temporary leave, reduced working hours) as well as cope with increased caregiving time due to the closure of educational facilities [4]. In addition, a substantial percentage of caregivers reported a decrease of household income and/or an increase in household debt [5]. In somehow comparable contexts, caregivers' warmth decreased and harsh parenting increased [e.g., during the 2008 global recession: 24–26]. From a developmental perspective, parental strain is known to be detrimental to child development. A large set of empirical studies has demonstrated negative effects of parental strain on children's physical, social-emotional, and cognitive development [e.g., 27, 28]. For example, one study found longitudinal reciprocal effects between parenting stress and child externalizing behavior for children aged 4 to 10 years [29]. Thus, theoretical considerations point to parental stress as an important construct to address when investigating the impact of COVID-19 related pandemic policies on children and families [e.g., 30]. As parental stress in response to COVID-19 related policies can be subject to quick changes as the COVID-19 environment (e.g., restrictions, working conditions, operation of educational facilities) evolves, it constitutes a variable expected to be volatile over the course of the pandemic. Following the above theoretical considerations, these changes in parental stress manifest themselves at the level of caregiver-child interactions (e.g., sensitive and responsive caregiving), which in turn might impact children's well-being. Subsequently, two major questions concerning the longitudinal role of parental strain arise. First, are there specific longitudinal relations between parental strain and child well-being and problem behavior, possibly even reciprocal, during the COVID-19 pandemic? Second, is situation-related parental change in stress related to the situation-related change in children's well-being and problem behavior? That means, do the dynamics of change in parental well-being affect the dynamics of change in child well-being across the pandemic-related changing context? Importantly, large scale studies during the pandemic such as

the current one present an unique opportunity since the dawn of empirical developmental research to test, amongst others, theories relating caregiver qualities to child well-being. The current study aims to address this question in detail.

Besides the volatile parental strain construct, developmental theories also point to the important role of more stable and enduring concepts during the COVID-19 pandemic such as the parent–child relationship quality and parental self-efficacy in child-rearing. That is, other than parental strain, which is directly affected by macrostructural changes induced by the COVID-19 pandemic, the parent–child relationship quality describes the general nature of the relationship prior to and less affected by the COVID-19 pandemic. First evidence seems to underscore this proposition as the majority of parents does not report a change in the parent–child relationship quality during the peak of the pandemic [5]. Likewise, parental self-efficacy can be conceptualized as parents' general conviction of their child rearing competencies regardless of the COVID-19 pandemic. Thus, both can be viewed as a possible risk or protective factors in the adjustment to COVID-19 pandemic policies.

Turning to relationship quality first, the many uncertainties around the COVID-19 pandemic and children's dependency on their caregivers constitute strong theoretical reasons to view it as a pivotal factor accounting for children's positive adjustment in times of the pandemic [1, 31; see also 32]. A vast amount of literature points to the relations between parent–child relationship quality and a number of child and adolescent outcomes [e.g., 33–35]. For example, one study showed that a positive relationship quality in middle childhood and adolescence can act as a buffer by mitigating the adverse effects of peer stressors on symptoms of depression [33]. Specifically, one could conceive of children being better able to cope with periods of higher parental stress if they can rely on a positive relationship to their parents in general. Thus, the parent–child relationship quality can be conceptualized as a moderator of the effect of parental stressors on child well-being. From a theoretical perspective, a positive parent–child relationship quality might be an important protective factor during the COVID-19 pandemic. That is, parent–child relationship quality might moderate effects of parental strain on child well-being in such a way that a positive relationship will buffer negative effects of parental strain. In other words, the parent–child relationship quality might change the strength of the effect between parental strain and child well-being in such a way that the more positive the parent–child relationship, the weaker the effect of parental strain on child well-being.

A further theoretically relevant parental quality in the context of the COVID-19 pandemic is parents' belief in their ability to perform their parenting role successfully (i.e., parental self-efficacy concerning child-rearing; [36]). Numerous studies underscore the positive effects of parental

self-efficacy on child psychological functioning and assessment [e.g., 37–39; for a review see 40]. For example, one study found that parental self-efficacy was negatively related to anxiety as reported by preschoolers and that parental self-efficacy could act as protective factor in the development of anxiety [38]. Theoretically speaking, high values of parental self-efficacy could have positive effects on child well-being and problem behavior especially during the intense COVID-19 related lockdown restrictions, as parenting roles faced the arguably biggest challenges during this time frame.

The Current Study

The present study employs a longitudinal developmental framework to investigate temporal dynamics of child well-being and problem behavior during the early phase of the COVID-19 pandemic. Thus, the current study aims at deepening our knowledge of longitudinal effects of COVID-19 pandemic policies on children's well-being. Thereby, the present research complements a previous study reporting cross-sectional findings from the first lockdown period (T1) within the same sample [30]. Specifically, the present research advances developmental theorizing by investigating if and to what extent children's well-being and problem behavior change alongside the changes in distal factors (e.g., loosening of public health-related lockdown restrictions from first to second measurement point). That is, the current study tests propositions of bioecological models stressing the importance of the macrostructural environment and its changes for child development. In addition, it investigates theoretical claims regarding the importance of caregiver availability and caregiver stress for children's well-being in challenging situations. Finally, it examines theoretical accounts suggesting that the parent–child relationship quality is a crucial protective factor in children's adjustment to the pandemic. Taken together, the current study assesses a number of theoretical developmental aspects relevant to risk factors and psychopathological conditions during the pandemic and beyond. That is, by investigating the impact of the COVID-19 pandemic on child well-being in behavioral and emotional domains, the present study aims to contribute to identifying crucial developmental changes that might bear on clinical conditions and psychopathological development in children over the course of the pandemic.

In the present study, parents reported on child problem behavior and well-being as well as parental strain, parental self-efficacy, and parent–child relationship quality. Given the above theoretical consideration concerning especially young children's proposed vulnerability to the social disruptions during the COVID-19 pandemic, we focused on 3 to 10 year old children.

Based on the theoretical propositions above, we predicted that (1) cross-sectionally within T1, parental self-efficacy, parent–child relationship quality, and parental stress would relate to child well-being and problem behavior, that (2) parental stress would decrease and child well-being would increase during the transition of strict restrictions (T1) to loosened restrictions (T2), that (3) parental strain at T1 would negatively predict child well-being and positively predict problem behavior at T2, that (4) decreases in parental strain between T1 and T2 would predict increases in child well-being and decreases in problem behavior between T1 and T2, that (5) as a protective factor the parent–child relationship quality would moderate the effects in hypotheses three and four in such a way that the more positive the parent–child relationship quality the weaker the adverse effects of parental strain on child well-being and problem behavior.

Method

Participants

At the first measurement point (T1), the final sample consisted of 2921 participants. We excluded 283 additional participants who started the questionnaire, but did not proceed with answering questions pertaining to the key variables (parental strain, child well-being and problem behavior, parental self-efficacy, relationship quality $n = 183$) and participants who reported no valid age of the child or an age outside the age range of 3–10 years ($n = 100$). Out of the 2921 participants at T1, 1851 participants gave their consent and provided their e-mail address to be invited to a follow-up questionnaire (i.e., T2). At the second measurement point (T2), a total of 890 participants (out of 1,851 invited participants) answered the follow-up questionnaire (retention rate of 48%) and made up the final T2 sample. We excluded an additional 324 participants due to incomplete answers ($n = 99$), due to children's ages missing or outside the 3–11 years age range ($n = 16$), due to the failure to match participants' answers at T1 and T2 based on the ID-codes ($n = 157$), and due to non-matching age and gender variables between T1 and T2 ($n = 52$). Importantly, we collected data for T1 at the pinnacle of the health-related lockdown restrictions in Germany (end of April—beginning of May 2020) to cover the arguably most challenging phase of the COVID-19 pandemic for children and families so far. During this time frame, educational facilities were closed down with digital forms of learning yet to be installed (e.g., virtual schools). Kindergartens were open only on an emergency care schedule for a small subgroup of children whose parents pursued highly system-relevant professions (e.g., physicians). In addition, government policies restricted physical social interactions to one's own household and implemented

nationwide curfews. Data for the second measurement point, to which families who had already participated at T1 were openly invited, was collected in the middle of July 2020 when the major lockdown restrictions (e.g., meeting people from other households) had been loosened. Participants were recruited via online postings, Email invitations to families associated with the lab, and by words of mouth.

The demographic characteristics of the sample are displayed in Table 1. The local ethics committee approved the study as part of a larger longitudinal project on the impact of the COVID-19 pandemic on children and families. Participants provided their informed consent and could take part in a raffle of ten (T1) and five (T2) 50 € gift vouchers at the end of the questionnaire.

Power Analysis

Using the R-package *semPower* [41], we conducted a statistical power analysis for SEM models. Specifying the effect size as $RMSEA = 0.05$, $\alpha = 0.05$, $power = 0.80$, and 10 degrees of freedom, the required sample size was 651. In addition, we followed Kline's [42] guideline of more than 100 participants for a medium sample size for SEM analyses. Therefore, we aimed at a final sample of at least $N = 700$.

Materials

As this study aimed at uncovering longitudinal parent and child dynamics during the COVID-19 pandemic, we primarily focus on the measures relevant for investigating change between T1 and T2. For both measurement points, the online survey comprised three blocks: (1) demographics and parental strain, (2) situation of the child during the COVID-19 pandemic, as well as (3) general measures of parental self-efficacy and parent–child relationship quality. In the introduction, we asked participants to have the primary caregiver of both parents in terms of time complete the survey at both measurement points. In the following, we present the three blocks consecutively. Given that the survey at T2 was largely a shortened version of the T1 survey, we describe the T1 survey below and indicate the parts that were also included in the T2 survey.

The rationale for assessing some variables at both measurement points and some variables only at T1 were theoretical considerations about which variables would be expected to change to a notable degree between the two measurement points. That is, especially parental strain, child well-being, and child problem behavior were expected to change to a noticeable extent over the course of the pandemic, whereas parent–child relationship quality, parental self-efficacy concerning child rearing, and parental strategies were expected to remain more stable.

Table 1 Key demographic characteristics of the sample at T1 (N = 2921) and T2 (N = 890)

Demographic variable	T1	T2
<i>Vocational degree</i>		
University degree	49%	–
Vocational training	24%	–
University of applied sciences degree	15%	–
Professional academy	8%	–
Master training	3%	–
No vocational degree	1%	–
<i>Current job status</i>		
Home office	44%	31%
Job outside of the home	18%	35%
Parental leave	17%	18%
Reduced working hours	6%	4%
No job	5%	5%
Exempted	4%	2%
Other	6%	5%
<i>Change in attendance of educational institutions</i>		
Yes, my child visits preschool again	–	52%
Yes, my child visits school again	–	34%
No, my child continues to visit an institution	–	6%
Yes, my child visits a daycare center again	–	4%
No, my child continues to visit no institution due to COVID-19	–	3%
No, my child continues to visit no institution	–	1%
<i>Change in further extra familial childcare (grandparents, nanny, ...)</i>		
No, my child continues to receive no extra familial childcare	–	40%
Yes, my child receives extra familial childcare again	–	34%
No, my child continues to receive no extra familial childcare due to COVID-19	–	18%
No, my child continues to receive extra familial childcare	–	7%

Demographics

The first block consisted of demographic questions concerning the parent and the child. Regarding the parent, participants indicated their age (T1 and T2), gender (T1 and T2), family and partner status (only T1), gender of partner (only T1), number of children in the household (only T1), state of residence (only T1), housing situation (only T1), educational degree of self and partner (only T1), current job status of self and partner (T1 and T2), and relative childcare work of both partners in percent. Moreover, participants answered how many more hours they spent caring for the child on a daily basis as compared to before the pandemic (T1 and T2). Concerning the child, demographic questions assessed age (T1 and T2), gender (T1 and T2), and educational institution (kindergarten, school).

Parental Strain (T1 and T2)

We included a set of three questions concerning parental strain as compared to before the pandemic (“I feel more strained in the current situation than normally”, “The current

situation is more challenging for me than normally”, “I feel more stressed out in the current situation than normally”; Cronbach’s α (T1) = 0.91, Cronbach’s α (T2) = 0.94). Parents answered on a Likert scale ranging from 1 (“do not agree at all”) to 5 (“totally agree”). The scoring of parental strain relied on these same three items for both measurement points. For the subsequent analyses, we computed the mean across the three items to form the *parental strain* variable. In addition, we assessed only at T2 how the extra familiar child care situation changed between T1 and T2. That is, one question assessed possible changes in children’s attendance of educational institutions. A second question assessed possible changes in further extra familiar childcare arrangements (e.g., grandparents did not look after the child at T1 due to COVID-19 lockdown restriction but grandparents looked after the child again at T2).

Situation of the Child During the COVID-19 Pandemic

Child Well-Being: KIDSCREEN (T1 and T2) To measure the impact of the COVID-19 pandemic on the child, we modified 12 items from the German translation of the 52-items

KIDSCREEN Health-Related Quality of Life Questionnaire for Children and Adolescents (Ravens-Sieberer et al., 2006). The KIDSCREEN-52 was designed to measure 10 dimensions of health and well-being (physical and psychological well-being, moods and emotions, self-perception, autonomy, parent relations and home life, social support and peers, school environment, social acceptance, and financial resources) in healthy and chronically ill children and adolescents. Cronbach's Alphas for the dimensions range between 0.76 and 0.89. The KIDSCREEN evidences good convergent and discriminant validity [43].

There were three main reasons for using a specific selection of items (see below for wording of the items used). First, COVID-19 related lockdown restrictions and social distancing measures made some scales inapplicable (e.g., friends, school and learning, others). That is, as there were practically no social interactions or digital educational setups during T1, we dropped items relating to interactions between friends and items relating to the school/kindergarten setting. Second, the wording for a couple of items was very similar and given the time constraints of the survey we only used one of these items (e.g., "was in a good mood" but not "was happy"; "enjoyed life" but not "was satisfied with life"). Third, we selected scales (e.g., "feelings" and "general mood" but not "physical activities" and "health") based on theoretical relevance for assessing the impact of the COVID-19 pandemic on children and families. In addition, we modified the items to not assess quality of life at a single time point (as in the original version), but to assess positive and negative changes in quality of life between the time preceding the COVID-19 pandemic and the time of the strictest lockdown measures (T1) as well as the time of the loosened lockdown restrictions (T2). That is, participants rated on a 7-point scale how much more or how much less their child had positive emotions, moods, time for itself and with its parents (four subscales in total) during the weeks of the complete lockdown (T1) and during the weeks of the loosened lockdown restrictions (T2) as compared to before the COVID-19 pandemic. The response scale ranged from 1 ("clearly less") to 7 ("clearly more") with the middle category 4 denoting "no difference". The items were ("Compared to the situation before the COVID-19 pandemic, my child (item 1–12) in the last weeks?"): (1) enjoyed life, (2) was in a good mood, (3) had fun (1–3 aggregated to scale "emotions"; Cronbach's α (T1)=0.88, Cronbach's α (T2)=0.91), (4) was sad, (5) felt so bad that s/he did not want to do anything, (6) was lonely (4–6 aggregated to scale "moods"; Cronbach's α (T1)=0.78, Cronbach's α (T2)=0.83), (7) was content (single item scale for "life satisfaction"), (8) had time for himself/herself, (9) was able to do things s/he wanted to do in its free time (8–9 aggregated to scale "free time"; Cronbach's α (T1)=0.40, Cronbach's α (T2)=0.28— as this subscale failed to reach acceptable reliability values,

it was not used for our analyses), (10) felt that its parents had time for it, (11) felt fairly treated by its parents, and (12) has been able to talk to its parents when s/he wanted (10–12 aggregated to scale "family"; Cronbach's α (T1)=0.71, Cronbach's α (T2)=0.72). For the subsequent analyses, we first recoded the three reversely coded items of the moods subscale. Then, we computed the mean across items for all subscales except free time (due to the low reliability). The three subscales of children's well-being that all addressed children's emotional well-being (emotions, moods, life satisfaction) were highly interrelated at T1 ($r_s > 0.69$) and at T2 ($r_s > 0.76$), so we calculated the mean across emotions, moods, and life satisfaction (referred to as *emotional well-being* in the subsequent analyses). The subscale "family" entered the following analyses as *family-related well-being*.

Child Problem Behaviors (T1 and T2) To assess the child's behavioral and emotional problems at both measurement points, we modified the subscales (emotional symptoms, conduct problems, hyperactivity-inattention) and items of the Strengths and Difficulties Questionnaire [SDQ; 44]. Reliabilities of the original SDQ subscales evidenced acceptable to good values and range between Cronbach's $\alpha=0.58$ – 0.76 [45]. Each subscale consists of 5 items, the language of administration was German. Parents were asked to report on their child's problem behavior with respect to the last three weeks. Thus, we ensured that the reported time frame was located completely within the lockdown period (for T1) and completely within the period of loosened restrictions (for T2). For the same reason as above with the KIDSCREEN, we chose these three subscales as further subscales largely focused on social interactions with other children. Given the COVID-19 related social distancing measures (e.g., closure of educational facilities, strict policies prohibiting social interactions between households), we had to modify and shorten some of the remaining items (e.g., remove references to behavior at school or towards other children). To keep the item structure similar overall and to avoid ambiguous item formulations (e.g., "Often unhappy, depressed, or tearful"), we also adapted the remaining items as follows: emotional problems ("Often complains of headaches", "Has many worries", "Often unhappy", "Nervous or clingy", "Has many fears"; Cronbach's α (T1)=0.77, Cronbach's α (T2)=0.75), conduct problems ("Often has temper tantrums", "Generally obedient", "Often fights", "Often lies or cheats", "Steals from home"; Cronbach's α (T1)=0.71, Cronbach's α (T2)=0.69), and hyperactivity ("Restless, overactive", "Constantly fidgeting", "Easily distracted", "Reflects", "Sees tasks through to the end"; Cronbach's α (T1)=0.66, Cronbach's α (T2)=0.66). Participants answered on the original 3-point scale (0 – "not true, 1 – "somewhat true", 2 – "certainly true"). After recoding the three reversely coded items, we calculated sum scores for

each of the subscales. As all subscales of problem behavior (emotional, conduct, hyperactivity) were highly interrelated at T1 ($r_s > 0.35$) and T2 ($r_s > 0.31$), we computed the mean across the three subscales as an overall measure of children's problem behavior (referred to as *problem behavior* in subsequent analyses). Given that mean scores and sum scores are perfectly correlated and therefore lead to the same results in regression-based statistical analyses, we used the mean score to combine the three subscales as it enhances interpretability.

Parental Self-efficacy (only T1) and Parent–Child Relationship Quality (T1 and T2)

The third part of the questionnaire was intended to assess more enduring and general parental and relationship qualities that are characteristic for our participants. To measure parental self-efficacy (only T1), we included an established parenting self-efficacy questionnaire (The Parenting Self-Efficacy Questionnaire—FSW), consisting of 9 items [46]. The questionnaire assesses the unidimensional construct of parenting self-efficacy (example item: “I think that I am capable of everything a mother/a father needs to be capable of.”). The original FSW showed good psychometric properties (Cronbach's $\alpha = 0.78$). Participants provided answers on a 4-point Likert scale ranging from 1 (“disagree”) to 4 (“agree”). We calculated the mean across all 9 items for the subsequent analyses. In addition, we assessed the quality of the parent–child relationship at both measurement points by adapting 8 items from the Network of Relationships Inventory [NRI; 47]. The original NRI questionnaire evidenced acceptable to good reliability values with Cronbach's $\alpha > 0.60$ for all relevant scale scores [47]. The items combined into four pairs made up the scales “Intimacy” (Cronbach's α (T1) = 0.88, Cronbach's α (T2) = 0.89), “Admiration” (Cronbach's α (T1) = 0.70, Cronbach's α (T2) = 0.71), “Conflict” (Cronbach's α (T1) = 0.80, Cronbach's α (T2) = 0.84), and “Dominance” (Cronbach's α (T1) = 0.66, Cronbach's α (T2) = 0.72; example item: “My child tells me what he/she is thinking” from the intimacy scale). The response format ranged from 1 (“never”) to 5 (“very often”). Given that the positive aspects (intimacy and admiration; T1: $r = 0.29$; T2: $r = 0.33$) and the negative aspects (conflict and dominance; T1: $r = 0.23$; T2: $r = 0.26$) correlated most strongly with each other, we further calculated one mean for the positive aspects and one comprising the negative aspects (referred to as negative and positive aspect of the relationship quality in subsequent analyses).

Procedure

We hosted the questionnaire on Qualtrics for both measurement points. The average response time was approximately

15 min at T1 and about 7 min at T2. Introductory instructions explained the purpose of the study and informed participants about data privacy topics. All participants agreed to the anonymous storage of their data at both measurement points.

Next, participants completed the survey in a fixed order (see [Materials](#) for details). The first block consisted of the demographic questions and the items on parental strain. The second block covered the child's behavior and well-being as well as parental strategies (only T1). Finally, the third block consisted of questions about parenting self-efficacy (only T1) and about the parent–child relationship quality.

Analyses

All analyses were computed in R 4.0.2. We used the package lavaan for testing all models [48]. To examine longitudinal dynamics between COVID-19 related processes, we employed both Cross-Lagged Panel Models and True Intraindividual Change models. *Cross-Lagged Panel Models (CLPM)* allow to identify relations between variables across time and inform about the directionality of longitudinal relations. The basis for CLPMs are two (or more) variables which are assessed at two (or more) time points. In this case, we assessed parental strain and child problem behavior at two measurement points. Subsequently, there are three types of effects one can identify: (1) cross-sectional effects, that is, the relation between the measured variables within each measurement point (e.g., correlation between parental strain and child problem behavior at T1); (2) stability effects, that is, the temporal relations of a given variable across measurement points (e.g., the stability of parental strain from T1 to T2); and (3) cross-lagged relations, that is, longitudinal effects of one variable on the other (e.g., effects of parental strain at T1 on child problem behavior at T2). Typically, these cross-relations are the focal point of interest as they allow to investigate longitudinal effects between variables. *True Intraindividual Change (TIC) Models* are adapted path models that allow to test predictors of intraindividual change between two measurement points [49]. For that purpose, the variables of interest are modeled as state and change variable. In particular, measurements from T1 were defined as baseline variables and, following previous developmental research [cf. 23], latent change variables were computed to model intraindividual change. In detail, a latent baseline variable predicted the variable of interest at T1 and T2 and a latent change variable predicted the variable of interest only at T2.

We included all participants who completed at least the first key variable (parental strain). Missing data on the other key variables is as follows: At T1, data on child well-being is missing for 3% of participants, on child problem behavior for 4% of participants, and for relationship quality for 9%

of participants. At T2, data on child well-being is missing for 1% of participants, on child problem behavior for 2% of participants, and for relationship quality for 2% of participants. Following Little’s MCAR test, missing data on the key variables can be considered as missing completely at random both at T1 ($\chi^2 = 44.61, df = 35, p = 0.128$) and T2 ($\chi^2 = 31.82, df = 35, p = 0.622$). Following Graham [50], we used full information maximum likelihood estimation in our longitudinal analyses to account for missing data.

In order to evaluate model fits, we relied on χ^2 difference tests, Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), and Comparative Fit Index (CF). Note, the χ^2 test is significant for most of our models although other fit parameters indicate acceptable or good model fit. The significant χ^2 test might result from the large sample size rather than indicate insufficient model fit [51]. Data supporting our analyses are openly available on OSF at <https://osf.io/7dn3y/> (Fig. 1).

Results

For descriptive purposes, Table 2 presents means and standard deviations of key variables at the two measurement points for the final longitudinal sample. A zero-order correlation matrix of these variables is displayed in Table 3. In order to examine differences of the means between T1 and T2, we computed paired-sample t-test (see Table 2). Parental stress and children’s problem behavior decreased from T1 to T2. Children’s emotional well-being

increased while family-related well-being decreased. Positive aspects of the parent–child relationship quality slightly decreased across time.

Cross-Sectional Analyses for T1 (N=2921)

In order to examine influencing factors of children’s well-being and problem behavior at the peak of COVID-19 related restrictions (within T1), we computed multiple linear regressions. One regression focused on children’s emotional well-being as outcome variable, one focused on children’s family-related well-being, and one focused on children’s problem behavior. We included parental strain, positive and negative aspects of parent–child relationship quality, and parental self-efficacy as predictors. Predictors were entered simultaneously into each regression model (i.e., we ran three separate regression models with the same predictors). Results are presented in Table 4. Most important, parental strain was significantly associated with children’s well-being, both emotional and family-related. The higher parental strain, the lower children’s well-being was reported. Problem behavior was most strongly associated with parental strain. In addition, relationship quality and parental self-efficacy were significantly related to problem behavior. The higher parental strain, the higher negative aspects of relationship quality, the lower positive aspects of relationship quality, and the lower parental self-efficacy, the higher child problem behavior was reported.

Fig. 1 Representation of TIC models, exemplary for children’s emotions as one aspect of well-being. Boxes represent manifest variables, circles represent latent variables

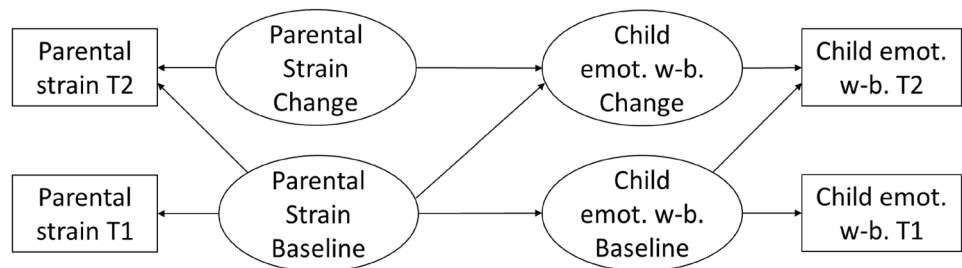


Table 2 Means and standard deviations for key variables at T1 and T2 for the final sample at T2

Variable	T1		T2		Mean comparison		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Parental stress	4.01	1.03	3.24	1.18	18.69	889	<.001
Well-being: emotional	3.40	1.17	4.29	1.12	-17.66	876	<.001
Well-being: family	4.21	1.10	4.04	0.85	4.34	876	<.001
Problem behavior	3.47	1.85	2.86	1.63	12.74	874	<.001
Relationship quality: positive	4.29	0.53	4.14	0.52	11.03	873	<.001
Relationship quality: negative	2.76	0.49	2.80	0.51	-3.05	873	.002
Parental self-efficacy	3.13	0.40	-	-	-	-	-

Comparison of the means using paired-sample t-tests

Table 3 Zero-order Pearson correlations of key variables at T1 and T2 for the final sample at T2 (N = 890)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
<i>T1</i>												
1. Parental stress												
2. Well-being: emot	-.54***											
3. Well-being: family	-.41***	.51***										
4. Problem behavior	.51***	-.58***	-.36***									
5. RQ: positive	-.06 ⁺	.02	.05	-.19***								
6. RQ: negative	.12***	-.10**	-.02	.29***	-.14***							
7. Parental self-effic	-.14***	.14***	.11**	-.32***	.44***	-.41***						
<i>T2</i>												
8. Parental stress	.40***	-.31***	-.21***	.33***	-.05	.06 ⁺	-.09**					
9. Well-being: emot	-.07*	.14***	.13***	-.09*	.02	-.04	.02	-.22***				
10. Well-being family	-.09*	.12***	.23***	-.09*	.04	-.04	.06	-.22***	.38***			
11. Problem behavior	.30***	-.33***	-.21***	.68***	-.21***	.29***	-.32***	.37***	-.32***	-.22***		
12. RQ: positive	-.09**	.11**	.14***	-.18***	.67***	-.13***	.39***	-.11**	.09*	.16***	-.26***	
13. RQ negative	.16***	-.12***	-.03	.33***	-.15***	.63***	-.37***	.18***	-.11**	-.07*	.46***	-.23***

RQ parent-child relationship quality

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

Table 4 Multiple linear regressions on children’s emotional well-being, family-related well-being and problem behavior within T1

	Emotional well-being			Family-related well-being			Problem behavior		
	β	p	95% CI	β	p	95% CI	β	p	95% CI
Parental strain	-.49	<.001	[-.59, -.52]	-.40	<.001	[-.47, -.40]	.43	<.001	[.72, .84]
RQ (positive)	-.01	.450	[-.11, .05]	.03	.137	[-.02, .14]	-.06	<.001	[-.34, -.09]
RQ (negative)	.01	.581	[-.06, .11]	.01	.678	[-.07, .10]	.15	<.001	[.44, .70]
Parental s.-eff	.03	.133	[-.03, .21]	.04	.055	[-.00, .23]	-.14	<.001	[-.86, -.50]
R^2, p	.25	<.001		.17	<.001		.31	<.001	

Standardized regression coefficient, p-value, and 95% confidence interval for each predictor
RQ parent–child relationship quality

Cross-Lagged Panel Models Across T1 and T2 (N= 890)

We computed separate CLPMs on mean-centered variables for the three aspects of children’s well-being (emotional, family) and problem behavior to investigate stabilities and cross-relations between parental strain and the respective child variable. In order to examine whether the cross-relations between parental strain and child behavior depend on the parent–child relationship quality, we included the interaction terms between relationship quality at T1 and the respective T1 variables in each model. We included both interaction terms for the cross-relation from child variable to parental strain and vice versa. To address both positive and negative aspects of relationship quality, we computed separate models for the two aspects. Thus, for each child variable (emotional well-being, family-related well-being, problem behavior), we computed two CLPMs, one addressing the moderating effect of the positive aspect of relationship quality and one addressing the negative aspect of relationship quality. Figure 2 displays an exemplary model regarding emotional well-being and problem behavior.

Parental Strain and Children’s Well-Being

All models addressing children’s well-being (emotional aspect; family) revealed an acceptable model fit, with $\chi^2(8, n= 890) < 32.6, p < 0.071, RMSEA < 0.06, SRMR < 0.03, CFI > 0.95$. The two models on children’s *emotional well-being (emotions, moods, life satisfaction)*, addressing the moderating effect of positive and negative aspects of relationship quality, revealed stability of parental strain, $\beta s > 0.31, ps < 0.001$, and of children’s emotional well-being, $\beta s > 0.14, ps < 0.001$, from T1 to T2. Within each measurement point, parental strain and children’s emotional well-being were negatively related, T1: $\beta = -0.54, p < 0.001$; T2: $\beta = -0.20, p < 0.001$.

Concerning relations across time points, the models revealed significant negative cross-relations from children’s emotional well-being to parental strain, $\beta s < -0.13, ps < 0.001$, but not vice versa, $\beta s < 0.02, ps > 0.681$. That means the worse children’s well-being at T1, the higher parental strain at T2. The cross-relation from children’s emotional well-being to parental strain tended to be moderated by the positive aspect of parent–child relationship quality, $\beta = 0.06, SE = 0.06, p = 0.065$: Children’s emotional

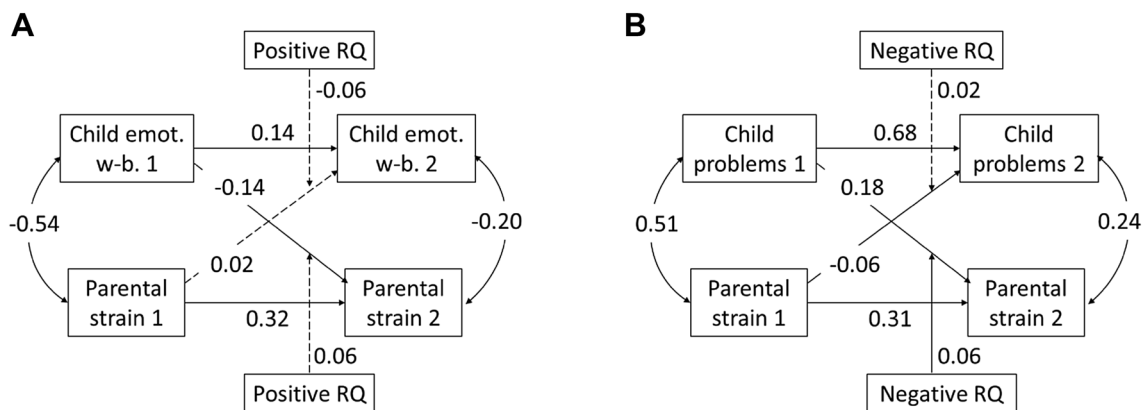


Fig. 2 Cross-lagged panel models regarding parental strain and children’s emotional well-being (A) and regarding parental strain and children’s problem behavior (B) with positive/negative aspect of par-

ent–child relationship quality (RQ) as moderator. Dashed arrows: n.s.; continuous arrows: $p < .05$

well-being at T1 was negatively related to parental strain at T2, particularly if the positive aspect of parent–child relationship quality at T1 was low. The moderation of the cross-relation from parental strain to children’s emotional well-being was also not significant, but approached the level of significance, $\beta = -0.06$, $SE = 0.07$, $p = 0.056$. All interactions with negative aspects of parent–child relationship quality were non-significant, $\beta_s > -0.04$, $ps > 0.243$.

The two models on children’s *family-related well-being* revealed stability of parental strain, $\beta_s = 0.37$, $ps < 0.001$, and of children’s well-being, $\beta_s = 0.23$, $ps < 0.001$. Within each measurement point, parental strain and children’s family-related well-being were negatively related, T1: $\beta_s = -0.41$, $p < 0.001$; T2: $\beta = -0.19$, $p < 0.001$.

Concerning relations across time points, the models revealed no significant cross-relations, neither from parental strain to children’s family-related well-being, $\beta_s < 0.02$, $ps > 0.672$, nor vice versa, $\beta_s = -0.06$, $ps > 0.073$. Likewise, parental strain did not interact with any aspect of relationship quality in predicting children’s family-related well-being, $\beta_s < 0.04$, $ps > 0.190$.

Parental Strain and Children’s Problem Behavior

The models revealed an acceptable model fit, χ^2 (8, $n = 890$) < 53.2 , $p < 0.001$, $RMSEA < 0.08$, $SRMR < 0.04$, $CFI > 0.96$. Both models, one addressing the moderating effect of positive aspects and one addressing negative aspects of relationship quality, revealed stability of parental strain, $\beta_s = 0.31$, $p < 0.001$, and children’s problem behavior, $\beta_s > 0.68$, $p < 0.001$, from T1 to T2. Within each measurement point, parental strain and children’s problem behavior was positively related, T1: $\beta = 0.51$, $p < 0.001$; T2: $\beta = 0.24$, $p < 0.001$.

From T1 to T2, the model revealed a significant positive cross-relation from children’s problem behavior to parental strain, $\beta_s = 0.18$, $p < 0.001$, and a small negative cross-relation from parental strain to children’s problem behavior, $\beta_s = -0.06$, $ps < 0.05$. That means the higher children’s problem behavior at T1, the higher parental strain at T2. And the higher parental strain at T1, the lower children’s problem behavior at T2. Importantly, the cross-relation between children’s problem behavior and parental strain was moderated by the negative aspect of parent–child relationship quality, $\beta = 0.06$, $SE = 0.04$, $p = 0.038$: Children’s problem behavior at T1 was positively related to parental strain at T2, particularly if the negative aspect of parent–child relationship quality at T1 was high. A follow-up simple slope analysis on the respective multiple regression including the interaction term revealed a significant relation between child problem behavior at T1 and parental strain at T2 for low (-1 SD; $b = 0.07$, $p = 0.019$), medium (M ; $b = 0.11$, $p < 0.001$), and high ($+1$ SD; $b = 0.16$,

$p < 0.001$) levels of negative aspects of relationship quality. That is, the relation between child problem behavior at T1 and parental strain at T2 was significantly positive for all levels of relationship quality but differed in its strength (see Fig. 3). All other interactions in the CLPMs were non-significant, $\beta_s < 0.04$, $ps > 0.082$.

In order to shed light on the impact of external regulations (strict lockdown versus looser regulations) on relations between parental strain and child variables, we exploratively examined whether these relations differed significantly between the two measurement points. For that purpose, we z -transformed the zero-order Pearson correlations and examined whether their 95% CI overlap. If this is not the case, the two correlations differ significantly. For all aspects of children’s well-being and problem behavior, relations with parental strain were significantly stronger at T1 than T2. Emotional well-being and parental strain were more strongly negatively correlated at T1, $r(888) = -0.54$, $p < 0.001$, than T2, $r(875) = -0.22$, $p < 0.001$. Likewise, family-related well-being, T1: $r(888) = -0.41$, $p < 0.001$; T2: $r(875) = -0.22$, $p < 0.001$, were more strongly negatively related to parental strain at T1 than T2. Children’s problem behavior and parental strain were more strongly positively correlated at T1, $r(888) = 0.51$, $p < 0.001$, than T2, $r(873) = 0.37$, $p < 0.001$. Parental strain was thus more strongly associated with child outcomes during the time of the strict lockdown compared to afterwards.

Taken together, parental strain was related to children’s well-being and problem behavior within measurement points. Results of the CLPM highlight longitudinal relations from child variables to parental strain rather than vice versa. Importantly, the findings show that the longitudinal relations between child and parent variables depend on the relationship quality.

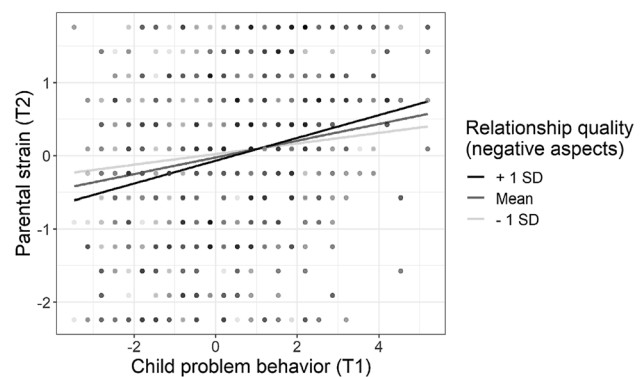


Fig. 3 Interaction between child problem behavior at T1 and negative aspects of relationship quality on parental strain at T2 (mean-centered scores). Slopes are depicted for low (-1 SD), medium (mean), and high ($+1$ SD) levels of negative relationship quality aspects

True Intraindividual Change Models Across T1 and T2 (N = 890)

TIC models are particularly suitable to examine factors that drive developmental change, because they allow to investigate whether change in one variable over two measurement points predicts intraindividual change in another variable. We computed separate TIC models for children's emotional well-being (emotions, moods, life satisfaction), children's family-related well-being and children's problem behavior to investigate effects of parental strain on the respective child variable.

Parental Strain and Children's Well-Being

The model addressing children's *emotional well-being* (emotions, moods, life satisfaction) revealed an acceptable model fit, except for RMSEA, with $\chi^2(1, n=890)=14.55$, $p<0.001$, RMSEA=0.12, SRMR=0.03, CFI=0.97. Parental strain at T1 positively predicted the change in children's emotional well-being, $\beta=0.30$, $SE=0.05$, $p<0.001$, 95% CI [0.335, 0.529]. That means the higher parental strain at T1, the greater the increase in children's emotional well-being across time. The change in parental strain from T1 to T2 negatively predicted the change in children's emotional well-being, $\beta=-0.17$, $SE=0.03$, $p<0.001$, 95% CI [-0.273, -0.139]. The greater the decrease in parental strain, the greater the increase in children's emotional well-being.

The model addressing children's *family-related well-being* revealed a good model fit, with $\chi^2(1, n=890)=3.17$, $p=0.075$, RMSEA=0.05, SRMR=0.01, CFI=0.99.

Parental strain at T1 positively predicted the change in children's family situation, $\beta=0.24$, $SE=0.04$, $p<0.001$, 95% CI [0.211, 0.369]. That means the higher parental strain at T1, the greater the increase in children's family-related well-being across time. The change in parental strain negatively predicted the change in children's family situation, $\beta=-0.15$, $SE=0.03$, $p<0.001$, 95% CI [-0.197, -0.098]. The greater the decrease in parental strain, the greater the increase in children's family-related well-being.

Parental Strain and Children's Problem Behavior

The model addressing children's *problem behavior* (emotional, conduct, hyperactivity) revealed an acceptable model fit, except for RMSEA, with $\chi^2(1, n=890)=24.02$, $p<0.001$, RMSEA=0.16, SRMR=0.04, CFI=0.98. Parental strain at T1 negatively predicted the change in children's problem behavior, $\beta=-0.22$, $SE=0.05$, $p<0.001$, 95% CI [-0.396, -0.208]. That means the higher parental strain at T1, the lower the change in children's problem behavior across time. The change in parental strain from T1 to T2 positively predicted the change in children's problem behavior, $\beta=0.23$, $SE=0.04$, $p<0.001$, 95% CI [0.197, 0.342]. The more parental strain decreased, the more children's problem behavior decreased.

Taken together, the change in parental strain predicted the change in children's emotional well-being, family-related well-being, and problem behavior. Results of the TIC models highlight the change of parental strain from T1 to T2 as a predictor of intraindividual change in children's well-being and problem behavior across the same time (see Fig. 4).

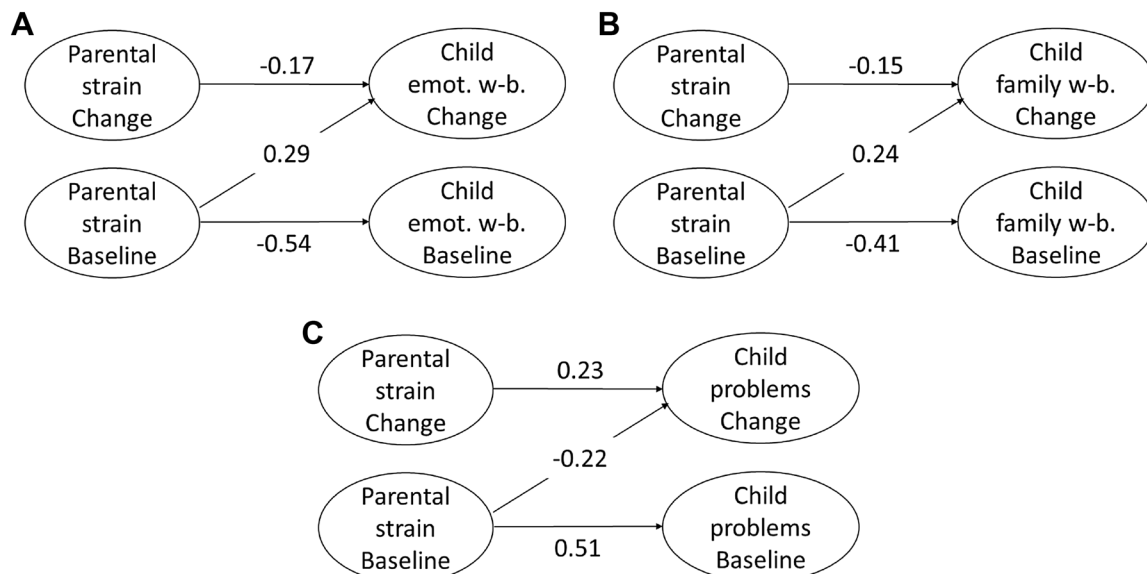


Fig. 4 True intraindividual change models: Results for children's emotional well-being (emotions, moods, life satisfaction) (A), for children's family-related well-being (B), and for children's problem behavior (C). Values indicate standardized path coefficients. All paths: $p<.05$

Discussion

The present study aimed at uncovering the developmental dynamics of child well-being and problem behavior during the COVID-19 pandemic. Most importantly, it is among the first to explore the temporal dynamics between parental strain and child well-being and problem behavior in a phase of quick and intense societal change. To this end, the current study employed a longitudinal developmental framework by assessing parents' self-reports on a wide range of parent and child variables at two measurement points—one at the peak of the COVID-19 induced lockdown and one after restrictions had been majorly loosened. A key focus was on the impact of parental strain on child well-being and problem behavior, and the protective role of parent–child relationship quality.

Overall, results indicated that during the strict lockdown restrictions, children's well-being and problem behavior were most strongly related to parental strain. As restrictions were loosened, parental stress as well as children's problem behavior decreased while child emotional well-being increased. Interestingly, findings from CLPMs showed that longitudinal relations were more pronounced for child variables (well-being, problem behavior) predicting parental strain than the other way around with parent–child relationship quality as a moderator. Importantly, TIC models revealed the change of parental strain to be a predictor of the change in children's well-being and problem behavior. This finding identifies the change in parental strain as a factor that drives developmental change in children's well-being and behavior. Overall, these results point to clear developmental changes in children's and parents' experiences of the pandemic and suggest important avenues for interventions.

Notably, our results are among the first to show the developmental trajectories of key child and parent indicators of well-being across the first phase of the COVID-19 pandemic. That is, there are tremendous changes from the peak of the lockdown restrictions to a situation about 10 weeks later where many restrictions had been loosened (e.g., partial reopening of educational facilities, reduced social distancing measures). Especially parental strain and children's problem behavior have decreased over this period while child well-being increased. These findings highlight the impact of the COVID-19 related protocols on families and children.

Moreover, these findings pertain to developmental theorizing in a number of ways. First, they underscore notions of bioecological models pointing to the significance of especially the meso- and macrosocial context for child well-being [e.g., 7, 8]. That is, they provide unique insights into child and family functioning under drastic

temporary changes of distal and consequently proximal factors. Thus, the disruption of macrosocial structures, which can only be tested in rare occasions like economic crises or pandemics, directly impacts on child well-being and family dynamics [see also 24–26]. Second, these results make a strong case for the external dependency of children in their well-being, coping, and behavior. Given that children's cognitive, self-regulative, and emotional capacities changed only slightly over this time frame, the above effects can be considered as caused by factors external to the child. Consequently, our findings indicate the influence of external disruptions on children's lives and point to the support children's needs in successfully navigating changing social environments.

At times of the strict lockdown children's well-being was strongly related to parental strain. This finding highlights the close interplay of child and caregiver psychological functioning. This is particularly pronounced at T1, which might stem from the intense contact at home and reduced external resources resulting from the general lockdown. In addition, a positive relationship quality and high parental self-efficacy emerged as protective factors, keeping child problem behavior low even though being faced with a challenging situation. This finding aligns with previous research reporting higher parental stress and parental worries to be a risk factor during the COVID-19 pandemic [e.g., 4, 52].

The cross-relations from child well-being and problem behavior during the lockdown to later parental strain outweighed cross-relations from parental strain to later child variables. That is, parental strain seems to be connected to previous child well-being to a much greater extent than the other way around. An explanation here could be that children's situation-related well-being affects parental strain straightforwardly, particularly given a non-optimal relationship quality, because they completely depend on the family system in times of the lockdown. Parents, on the other hand, might have more resources or opportunities to regulate the expression of their strain. Situational parental strain might thus not affect child well-being in such a direct way.

The finding that parent–child relationship quality acted as a moderator concerning the effect of child variables (well-being and problem behavior) on parental strain is especially noteworthy. Both relationship dimensions (positive, negative) show a specific pattern: While a high level of positive aspects of parent–child relationship quality buffers the negative effect of child well-being on parental strain, a high level of negative aspects intensifies negative effects of child problem behavior on parental strain. This relates well to findings showing parent–child relationship quality to be an important moderator of the effects of parent–child acculturation gaps on child outcomes such as externalizing behavior [53]. It is also in line with findings showing that only for negative relationship quality, child maltreatment

is related to lower levels of emotion regulation, which in turn predicts higher levels of internalizing and externalizing behavior [54]. Yet, relationship quality moderated the link from child well-being to parental strain, rather than the link vice versa that we expected. The finding suggests that also parents benefit from a positive relationship quality, as they might be able to better cope with children's problems. Thus, the present study extends previous findings by showing that a positive parent–child relationship quality can be considered an important resilience factor, especially in challenging social environments. Regarding public policies, the present research suggests that the parent–child relationship quality could be a promising avenue for interventions during the pandemic. That is, interventions furthering positive aspects of the parent–child relationship might be particularly well suited to buffer against negative effects of future pandemic-related restrictions on both, the parent and the child side.

The TIC models provide unique insights into the factors predicting children's situation-related adjustment to the COVID-19 pandemic in their well-being and problem behavior. That is, our results show that children's changes in well-being and problem behavior are significantly predicted by both, parental strain at T1 as well as change in parental strain between T1 and T2. These results underscore theories relating caregiver availability and strain to child well-being [e.g., 17, 18]. In addition, it is a very interesting finding, as it suggests that there are two parental factors crucial for children's adjustment to the COVID-19 pandemic [cf. 1]. First, parents' initial response to the COVID-19 induced turmoil is of importance. This aspect relates to parents' increased stress level as likely caused by the first days of the lockdown and the subsequent reorganizations of child care, work, and family routines. The greater this initial stress level, the greater the change in child emotional and family-related well-being and the smaller the change in child behavior problems. One possible interpretation here is that for initially highly stressed parents and subsequently initially highly stressed children, the possibility for the amelioration of children's well-being and problem behavior was greater. Second, parents' own adaptation to the COVID-19 pandemic policies as seen in their change of stress levels is a crucial factor. Specifically, decreases in parental strain predicted increases in child well-being and decreases in child problem behavior. It might be that decreased parental stress and increased parental well-being had positive effects on parenting practices [55] which in turn lead to improved child well-being and reduced problem behavior. Thus, one possible avenue for interventions during pandemic-related restrictions could be to especially provide social support for highly stressed parents (e.g., regarding the allocation of emergency child care places, financial support, online resources). Reducing stress could then in turn free up parental resources to cope with child-related and family-related issues. Given that our

cross-lagged panel analyses showed child behavioral constructs as predictors of later parental adjustments, future research during the pandemic should also examine possible relations between child variables and changes therein as predictors of changes in parental adjustments.

Previous studies on the impact of the COVID-19 pandemic have identified a number of domains that could be potentially relevant to psychopathological symptoms and clinical interventions. That is, in the wake of the COVID-19 pandemic children experienced disturbed sleeping patterns and decreased sleep quality [6], symptoms of anxiety and depression were frequently reported in children and adolescents [e.g., 2, 13], and parental anxiety and depression were associated with higher parental stress and child abuse potential [4]. The present findings relate well to these studies and extend them by showing longitudinal risk factors that might pave the way for maladaptive, psychopathological developments in children while also pointing to protective factors fostering adaptive outcomes. In terms of risk factors, our results suggest that increasing parental stress and a low parent child relationship quality clearly bear on children's emotional challenges, hyperactivity-related problems and general problem behavior. There seem to be potential pathways to psychopathological conditions related to emotional dysregulation, poor self-regulation, hyperactivity, and decreased overall well-being. In terms of protective factors, the coping capacities and stress levels of caregivers seem to be the most promising aspects contributing to adaptive development. This suggests that clinical interventions during the pandemic should especially focus on caregivers' well-being and coping abilities to promote a stable microstructural environment and prevent psychopathological developments.

While these findings provide unique insights, some limitations have to be noted. First, due to the limited accessibility of families during the lockdown and the aim of a high sample size, we relied on parental (self-)report measures. It is possible that parents' reports about their children's situation might be biased. Second, while the current study relied on materials based on validated scales, a few adaptations were necessary in order to fit the extraordinary situation. Third, the retention rate from T1 to T2 was rather low. At T2, when restrictions had been loosened, many parents might have returned to activities outside of the household, hence finding less time to take part in the study. Third, the present study relied on parent-report data due to the initial lockdown restrictions. Future work should additionally include child-based measures. Fourth, while the adaptation of scales (e.g., SDQ) was warranted due to the special circumstances during the lockdown period, it also prevents comparisons with norm values.

Taken together, our study emphasizes the complex interaction of caregivers and children for families' adjustment to the quickly changing COVID-19 situation. The findings

point to parental behaviors as possible starting points for COVID-19 related interventions.

Summary

The tremendous sweep of COVID-19 across the globe has uprooted human life. As our knowledge about the effects of the COVID-19 pandemic is still very limited, scientists have identified children and families as populations possibly particularly vulnerable. While parents are faced with new work settings and increased childcare demands, children might be in great need for emotional support, caregiver availability, and reliable relationships to caregivers. The present study employed a longitudinal developmental framework to provide unique insights into the relations between parental strain, child well-being, and child problem behavior while also examining the moderating role of parent–child relationship quality. At two measurement points (the first at the peak of the lockdown restrictions ($N=2921$), the second after restrictions had been majorly loosened ($N=890$)), parents reported their stress level, the parent–child relationship quality, and their child’s well-being and problem behavior. Results showed that at the peak of the restrictions, parental strain was negatively related to child well-being and positively related to child problem behavior. Between measurement points, parental stress and child problem behaviors decreased while child well-being increased. Cross-lagged panel analyses revealed longitudinal effects of child well-being and problem behavior at T1 on parental strain at T2 and the moderating role of the parent–child relationship quality, which acts as a protective factor. Finally, true intraindividual change models showed that decreases in parental strain between measurement points predicted increases in child well-being as well as decreases in child problem behavior. Taken together, our results indicate the strong impact of the COVID-19 pandemic on children and families. In addition, our results highlight the complex interaction between parental well-being and child well-being during the quickly changing COVID-19 environment. Thus, the present research points parental stress coping and child emotional adjustment as promising avenues for policy makers in their efforts to ensure child and family well-being throughout the pandemic.

Acknowledgements We thank all parents for participating in this study. This study was supported by a scholarship of the Claussen-Simon-Stiftung to SE.

Funding Open Access funding enabled and organized by Projekt DEAL.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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C Paper by Essler, Christner, & Paulus (in prep) – Study 3

Essler, S., Christner, N., & Paulus, M. (in prep). Child Psychological Adjustment During the COVID-19 Pandemic: A Four-Wave Naturalistic Quasi-Experimental Study

Short-Term and Long-Term Effects of the COVID-19 Pandemic on Child Psychological Well-Being: A Four-Wave Longitudinal Study

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Keywords: COVID-19; natural experiment; parent-child relationship quality; parental stress; child well-being; child problem behavior

Data availability: Data supporting the findings of this study are available under https://osf.io/5zrm2/?view_only=6f299181dc60412e88f5d7fc5b2d8770

Word count: 4,963

Declaration of Interest: None.

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Acknowledgements:

We thank all parents for participating in this study. This study was supported by a scholarship of the Claussen-Simon-Stiftung to SE.

Abstract

As the COVID-19 pandemic further unfolds as the hitherto largest sociohistorical disruption of the twenty-first century, it becomes a key theoretical and practical question how children deal with the pandemic itself as well as with the quickly changing public health measures and restrictions. Little empirical research has identified trajectories of child psychological well-being and explored which factors predict changes in child behavioral and emotional problems. This severely limits our understanding regarding the specific effects of lockdowns on child psychological welfare during the pandemic. The current study addressed this research gap by means of a naturalistically occurring quasi-experimental design: A (lockdown) – B (relaxation) – B (relaxation) – A (lockdown). We collected parental reports on parental stress, child problem behavior, and child well-being over four measurement occasions during the COVID-19 pandemic in Germany: from the first lockdown (T1 – spring 2020) to the following period of relaxation (T2 – summer 2020; T3 – fall 2020) on to the second lockdown (T4 – winter 2020/21). Our results showed different developmental trajectories. While child problem behaviors and emotional well-being improved after the first lockdown during subsequent periods of relaxation before worsening again in the second lockdown, child family related well-being steadily decreased over all four measurement points. Importantly, parental stress emerged as a strong risk factor amplifying the negative effects of the COVID-19 pandemic. The parent-child relationship quality constituted a resilience factor for child psychological well-being. The present study offers crucial insights furthering our understanding of child psychological well-being trajectories, thereby identifying important risk and resilience factors for child psychosocial well-being during the COVID-19 pandemic. These findings have major implications for policies aiming to further child health and family well-being during the COVID-19 pandemic.

Short-Term and Long-Term Effects of the COVID-19 Pandemic on Child Psychological Well-Being: A Four-Wave Longitudinal Study

The COVID-19 pandemic constitutes one of the major large-scale sociohistorical disruption of the twenty-first century. In the first year of the pandemic, strict lockdowns and periods of loosened restrictions followed each other and presented major challenges for child well-being and psychosocial adjustment (e.g., Brown et al., 2020; Calvano et al., 2021; Prime et al., 2020). However, we know little about the differences between long-term effects (i.e., of the pandemic generally independently of lockdowns) and short-term effects (i.e., specific effects of lockdowns) on child mental health and psychological well-being. This requires longitudinal work spanning multiple alternations of lockdowns and relaxations. The present study aimed at adding a novel perspective on this issue of great societal concern.

Specifically, the present study investigates trajectories of child mental health and psychosocial adjustment during the COVID-19 pandemic in Germany from the first lockdown to the following period of relaxation on to the second lockdown. That is, we examined developmental changes in children's problem behavior and well-being across four measurement points and investigated how parental stress and parent-child relationship quality affected individual trajectories thereof. Importantly, the present study is among the first to rely on an A (lockdown) – B (relaxation) – B (relaxation) – A (lockdown) design constituting a naturalistic quasi-experimental approach to more systematically investigate effects of lockdowns on child mental health. While findings from previous studies comparing pre-pandemic to lockdown or lockdown to further relaxations or lockdowns provide important first evidence on lockdown effects, the present naturalistic quasi-experimental design takes an important first step to differentiate short-term effects from long-term effects of the pandemic. Thus, the current study offers a novel methodological perspective on understanding trajectories of child psychological well-being during the COVID-19 pandemic.

Trajectories and Determinants of Child Psychological Well-Being

From a theoretical perspective, there are two child developmental trajectories that seem especially likely during the COVID-19 pandemic (e.g., Benner & Mistry, 2020; Elder, 1998). First, child mental health and well-being might be compromised first and foremost during the lockdown periods and then recover during relaxation periods (short term effects resulting in a wave-like trajectory). That is, one would expect children's well-being to be especially compromised during lockdowns and recover during relaxations. A host of studies provides empirical support for notions of lockdowns as particularly challenging phases for child and family functioning (Calvano et al., 2021; Christner et al., 2021; Essler et al., 2021; Giannotti et al., 2021; Marchetti et al., 2020; Patrick et al., 2020; Russell et al., 2022; Spinelli et al., 2020; Toppe et al., 2021).

Second, child developmental trajectories might follow a linear trend with consistently decreasing well-being and increasing problem behavior during the COVID-19 pandemic (long term effects of the pandemic in general independently of specific lockdowns resulting in a linear trajectory). Even during relaxation periods major stressors relating to caregivers (e.g., reduced working hours, financial insecurity, expectations and cognitions concerning the further course of the pandemic) often remain high. This could pose a continual threat to child well-being (Chung et al., 2020; Crescentini et al., 2020; Daks et al., 2020; Kim et al., 2021; Li & Zhou, 2021; Lionetti et al., 2022; Marchetti et al., 2020; Morelli et al., 2020; Spinelli et al., 2020; Sun et al., 2022; Zhang et al., 2022).

Previous longitudinal work on the effects of the COVID-19 pandemic demonstrated reduced psychological well-being from pre-pandemic to lockdown (Vogel et al., 2021) with recoveries from lockdown to subsequent relaxations (Berry et al., 2021; Essler et al., 2021; Raw et al., 2021) but reductions in child well-being from the first to subsequent lockdowns (Brandstetter et al., 2022; Gordon-Hacker et al., 2022; Ravens-Sieberer et al., 2021, 2022). Thus, longitudinal evidence concerning trajectories of child psychological well-being and

mental health remains inconclusive, largely due to methodological constraints. The current study addresses this research gap by testing two theoretical trajectories (wave-like trajectory and linear trajectory) against each other and thereby contributing novel insights on how children cope with the unfolding COVID-19 pandemic.

Theoretical models on child mental health and well-being suggest important interindividual differences in child adjustment to the pandemic. That is, it is predicted that some children will be able to cope better with the current challenges and show less adjustment difficulties than others. According to the Family Stress Model (Barnett, 2008; Lucassen et al., 2021; Masarik & Conger, 2017), COVID-19 induced social disruptions can lead to elevated caregiver stress, which in turn could favor inadequate parenting practices (e.g., harsh, authoritarian parenting) resulting in interindividual differences in child adjustment problems. Indeed, studies report associations between COVID-19 related parental distress and hostility and greater changes in child externalizing symptoms (Essler et al., 2021; Khoury et al., 2021; Raw et al., 2021). However, there is no work assessing the role of parental distress as risk factor for broader trajectories of child well-being leaving open the question if and to what extent parental distress compromises child mental health during different phases of the COVID-19 pandemic.

Theoretical frameworks of resilience have claimed that close social relationships are among the most important resilience factors for child well-being during social disruptions (Cicchetti, 2010; Masten, 2018; Masten et al., 2021; Masten & Motti-Stefanidi, 2020; Rutter, 2012; Sroufe et al., 2009). In the context of the COVID-19 pandemic, the parent-child relationship quality could therefore function as a resilience factor in children's developmental trajectories as also suggested by previous work (Bate et al., 2021; Du et al., 2021; Nicoli et al., 2022). However, there is no evidence on the longterm effects of the parent-child relationship quality on child well-being trajectories during the pandemic. The present study directly

investigates the theoretical possibility of the parent-child relationship functioning as important resilience factor.

The Current Study

The present work examines child developmental trajectories of problem behavior and well-being at four measurement points during the COVID-19 pandemic in Germany and tests parental stress and the parent-child relationship quality as potential risk and resilience factors. To this end, we assessed child emotional and behavioral problems as well as hyperactivity (child problem behavior; based on Goodman, 1997), child emotional and family-related well-being (Ravens-Sieberer, 2006), parental strain, and parent-child relationship quality (Furman & Buhrmester, 1985). Specifically, we relied on a naturalistically occurring quasi-experimental A (lockdown) – B (relaxation) – B (relaxation) – A (lockdown) design as a unique methodological opportunity to separate short-term from long-term effects on changes in child well-being.

Based on the above theoretical considerations, we hypothesized that child problem behavior and child emotional well-being would follow a wave-like trajectory while child family related well-being would steadily decline as COVID-19 related family stressor remained high during periods of loosened restrictions. In addition, we hypothesized that parental stress would negatively impact child well-being trajectories by increasing their volatility while the parent child relationship quality would positively impact well-being trajectories by decreasing their volatility.

Method

Participants

The final sample sizes of the four measurement points (T1-T4) were as follows: $N(T1) = 1,769$; $n(T2) = 873$; $n(T3) = 729$; $n(T4) = 748$. We excluded additional participants for not consenting

to be contacted for follow-up questionnaires (T1: $n = 1,008$), for starting the questionnaire but not answering any questions concerning the key study variables (parental strain, child well-being and problem behavior, parental self-efficacy, relationship quality; T1: $n = 183$, T2: $n = 99$, T3: $n = 117$, T4: $n = 121$), for providing unidentifiable or non-matching ID-codes (T1: $n = 42$, T2: $n = 157$, T3: $n = 131$, T4: $n = 160$), and for inconsistent or invalid age or gender reports (T1: $n = 202$, T2: $n = 85$, T3: $n = 67$, T4: $n = 66$). We recruited participants via online postings, via the lab database, and by words of mouth.

We collected data for T1 (end of April to beginning of May 2020) and T4 (end of January to beginning of March 2021) during the first two major lockdowns in Germany. These lockdowns arguably represent the most demanding phases of the COVID-19 pandemic for children and families so far (home office obligations, closure of educational facilities, restrictions on social interactions). In contrast, we collected data for T2 (middle of July 2020) during a time when all the major lockdown restrictions had been loosened. Collection of data for T3 (end of October to beginning of December 2020) took place during the case acceleration phase prior to the second lockdown. The present study reports an overall picture with two smaller reports on T1 and T2 having been published previously (references blinded for review).

Table 1 shows the demographic characteristics of the sample. The current study was approved by the local ethics committee. Participants gave their informed consent.

Table 1

Key demographic characteristics of the sample at T1 ($N = 1,769$), T2 ($N = 873$), T3 ($N = 729$), and T4 ($N = 748$)

Demographic Variable	T1	T2	T3	T4
Vocational degree				
University degree	52%	-	-	-

Vocational training	21%	-	-	-
University of applied sciences degree	15%	-	-	-
Professional academy	8%	-	-	-
Master training	3%	-	-	-
No vocational degree	1%	-	-	-

Current job status

Home office	43%	31%	29%	44%
Job outside of the home	18%	35%	40%	29%
Parental leave	19%	18%	16%	11%
Reduced working hours	6%	4%	3%	3%
No job	5%	5%	5%	5%
Exempted	4%	2%	1%	2%
Other	6%	5%	6%	5%

Change in attendance of educational institutions as compared to T1

Yes, my child visits preschool again	-	53%	40%	16%
Yes, my child visits school again	-	34%	45%	17%
No, my child continues to visit an institution	-	6%	14%	36%
Yes, my child visits a daycare center again	-	4%	0%	0%
No, my child continues to visit no institution due to COVID-19	-	3%	0%	28%
No, my child continues to visit no institution	-	1%	0%	3%

Change in further extra familiar childcare (grandparents, nanny, ...) as compared to T1

No, my child continues to receive no extra familial childcare	-	40%	42%	45%
Yes, my child receives extra familial childcare again	-	34%	32%	17%
No, my child continues to receive no extra familial childcare due to COVID-19	-	18%	18%	24%
No, my child continues to receive extra familial childcare	-	8%	8%	15%

Power Analysis

We conducted an a-priori statistical power analysis for SEM models with the R-package *semPower* (Moshagen & Erdfelder, 2016). By entering the effect size as $RMSEA = 0.05$, $\alpha = .05$, $power = .80$, and 10 degrees of freedom, we obtained a required sample size of 651. Therefore, our objective was a sample of at least $N = 700$ at each measurement point.

Materials

Questionnaires comprised three blocks (see below). At all measurement points, we asked that the primary caregiver of the target child in terms of time answers the survey.

Block 1: Demographics and parental strain

Demographics (T1-T4). Demographic questions related to the parents the target child. Concerning the parents, questions addressed the participants' age (T1-T4), gender (T1-T4), family and partner status (T1), educational degree of self and partner (T1), current job status of self and partner (T1-T4), and housing situation and number of children in the household (T1). In addition, participants indicated to what extent the hours spent taking care of their child increased as compared to before the pandemic (T1-T4). Concerning the target child, questions addressed age (T1-T4), gender (T1-T4), and the changing status of educational institution attendance and other extrafamilial care arrangements (T1-T4).

Parental Strain (T1-T4). A scale of three questions assessed parental strain as compared to before the pandemic (“I feel more strained in the current situation than normally”, “The current situation is more challenging for me than normally”, “I feel more stressed out in the current situation than normally”; Cronbach’s α (T1) = 0.90, Cronbach’s α (T2) = 0.94, Cronbach’s α (T3) = 0.93, Cronbach’s α (T2) = 0.93). Participants responded on a Likert scale ranging from 1 (“do not agree at all”) to 5 (“totally agree”). Means across the three items were calculated to form the *parental strain* variable for subsequent analyses.

Block 2: Child’s situation during the COVID-19 pandemic

Child Well-Being – KIDSCREEN (T1-T4). We assessed the effects of the COVID-19 pandemic on the child by modifying 12 items from the German translation of the KIDSCREEN-52 Health-Related Quality of Life Questionnaire for Children and Adolescents (Ravens-Sieberer, 2006). It shows acceptable Cronbach’s Alphas for the dimensions (0.76 - 0.89) and demonstrates good convergent and discriminant validity (Ravens-Sieberer, 2006).

We selected the set of items as described below for three reasons. First, some subscales were inapplicable due to COVID-19 related lockdown restrictions. That is, due to reduced social interactions with friends and decreased attendance of educational institutions, we dropped items relating to these domains. Second, we dropped items with very similar wordings due to time constraints (e.g., we used “was in a good mood” but not “was happy”). Third, we chose subscales based on their theoretical relevance for the research questions (e.g., “feelings” but not “physical activities”). Further, we modified the items to address positive and negative changes in quality of life by comparing quality of life at the measurement points to the quality of life before the COVID-19 pandemic. Specifically, parents reported how much more or how much less their child had positive emotions, moods, time for itself and with its parents at the four measurement points as compared to before the onset of the COVID-19 pandemic. Participants answered on a scale from 1 (“clearly less”) to 7 (“clearly more”) with the middle category 4 denoting “no difference”.

The items were (“Compared to the situation before the COVID-19 pandemic, my child (item 1-12) in the last weeks?”): (1) enjoyed life, (2) was in a good mood, (3) had fun (1-3 aggregated to subscale “emotions”; Cronbach’s α (T1) = 0.88, Cronbach’s α (T2) = 0.91, Cronbach’s α (T3) = 0.88, Cronbach’s α (T4) = 0.87), (4) was sad, (5) felt so bad that s/he did not want to do anything, (6) was lonely (4-6 aggregated to subscale “moods”; Cronbach’s α (T1) = 0.78, Cronbach’s α (T2) = 0.83, Cronbach’s α (T3) = 0.77, Cronbach’s α (T4) = 0.80), (7) was content (single item subscale for “life satisfaction”), (8) had time for himself/herself, (9) was able to do things s/he wanted to do in its free time (8-9 aggregated to subscale “free time”; Cronbach’s α (T1) = 0.43, Cronbach’s α (T2) = 0.29, Cronbach’s α (T3) = 0.16, Cronbach’s α (T4) = 0.30 – subscale dropped due to low reliability values), (10) felt that its parents had time for it, (11) felt fairly treated by its parents, and (12) has been able to talk to its parents when s/he wanted (10-12 aggregated to subscale “family”; Cronbach’s α (T1) = 0.69, Cronbach’s α (T2) = 0.73, Cronbach’s α (T3) = 0.62, Cronbach’s α (T4) = 0.65). We calculated means for the subscales. Given the high intercorrelations between the three subscales relating to children’s emotional well-being (emotions, moods, life satisfaction; $r_s > .59$ for T1-T4), we computed means across the subscales to yield the variable *emotional well-being* for the subsequent analyses. The subscale “family” was included as *family-related well-being* in the subsequent analyses.

Child Problem Behaviors (T1-T4). We used three modified subscales (emotional symptoms, conduct problems, hyperactivity-inattention) of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) based on theoretical considerations to investigate children’s problem behavior. Reliabilities of the SDQ subscales have been reported as acceptable with Cronbach’s $\alpha = 0.58 - 0.76$ (Stone et al., 2010). We asked participants to answer the questions with respect to the last three weeks on a 3-point scale (0 – “not true, 1 – “somewhat true”, 2 – “certainly true”). To make the items compatible with COVID-19 related

lockdown restrictions, we adapted and shortened the respective items (e.g., removing references to behavior at school or towards other children). To avoid ambiguous item phrasing (e.g., “Often unhappy, depressed, or tearful”) and to keep the structure of items comparable, we also modified the other items as follows: emotional problems (“Often complains of headaches”, “Has many worries”, “Often unhappy”, “Nervous or clingy”, “Has many fears”); Cronbach’s α (T1) = 0.77, Cronbach’s α (T2) = 0.69, Cronbach’s α (T3) = 0.68, Cronbach’s α (T4) = 0.70), conduct problems (“Often has temper tantrums”, “Generally obedient”, “Often fights”, “Often lies or cheats”, “Steals from home”); Cronbach’s α (T1) = 0.70, Cronbach’s α (T2) = 0.65, Cronbach’s α (T3) = 0.60, Cronbach’s α (T4) = 0.63), and hyperactivity (“Restless, overactive”, “Constantly fidgeting”, “Easily distracted”, “Reflects”, “Sees tasks through to the end”); Cronbach’s α (T1) = 0.66, Cronbach’s α (T2) = 0.66, Cronbach’s α (T3) = 0.66, Cronbach’s α (T4) = 0.65). We computed sum scores for the subscales. Due to their substantial intercorrelations ($r_s > .28$ for T1-T4), we calculated means across the three subscales to yield an overall *problem behavior* variable for subsequent analyses.

Block 3: Parent-child relationship quality (T1-T3)

To assess the quality of the parent-child relationship, we modified 8 items from the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985). Previous work demonstrated its acceptable reliability values with Cronbach’s $\alpha > 0.60$ (Furman & Buhrmester, 1985). Participants responded on a scale ranging from 1 (“never”) to 5 (“very often”). Combining the items into four pairs resulted in the subscales “Intimacy” (Cronbach’s α (T1) = 0.88, Cronbach’s α (T2) = 0.89, Cronbach’s α (T3) = 0.90; example item: “My child tells me what he/she is thinking”), “Admiration” (Cronbach’s α (T1) = 0.68, Cronbach’s α (T2) = 0.71, Cronbach’s α (T3) = 0.72), “Conflict” (Cronbach’s α (T1) = 0.80, Cronbach’s α (T2) = 0.84, Cronbach’s α (T3) = 0.86), and “Dominance” (Cronbach’s α (T1) = 0.67, Cronbach’s α (T2) = 0.72, Cronbach’s α (T3) = 0.74). As the positive aspects (intimacy and admiration; $r_s > .31$

for T1-T3) and the negative aspects (conflict and dominance; $r_s > .23$ for T1-T3) correlated most strongly with each other, we computed means across the positive/negative aspects to yield the variables *positive/negative relationship quality* for subsequent analyses. Parenting self-efficacy was assessed at T1 but is not relevant for the current analyses.

Procedure

The questionnaires of all measurement points were hosted on Qualtrics with approximately 10-15 minutes completion time. At the beginning of each questionnaire, instructions informed participants about the purpose of the study and data privacy. Subsequently, participants completed the three blocks of the questionnaire.

Analyses

We ran all analyses in R (R Core Team, 2020). In the first part of the analyses, we aimed to describe the trajectories of the key variables (parental strain, child emotional well-being, child family-related well-being, child problem behavior) across the four measurement points. To that end, we fitted Latent Growth Models (LGM) in a Structural Equation Modelling framework. For estimating linear growth, we fitted LGMs with intercepts and linear slopes only. For estimating quadratic growth, we fitted LGMs with intercepts, linear slopes, and quadratic slopes. In the second part of the analyses, we aimed to predict changes in child outcome variables between T1 and T2 and from T3 to T4. To that end, we fitted True Intraindividual Change (TIC) Models. TIC models constitute a statistical approach to test predictors of intraindividual change between two measurement points (Steyer et al., 2000). To increase power and to avoid bias due to missing data, we imputed missing data via predictive mean matching using the mice package (Enders et al., 2016; van Buuren & Groothuis-Oudshoorn, 2010). We used the package semTools (Jorgensen et al., 2021) to estimate the respective models on the imputed dataset (growth models for the trajectories with the function `growth.mi()` and TIC models with `sem.mi()`). Data supporting our analyses are openly available on OSF at https://osf.io/5zrm2/?view_only=6f299181dc60412e88f5d7fc5b2d8770.

Results

Descriptives of the key variables for all measurement points are presented in Table 2.

Table 2

Means (M) and standard deviations (SD) for the key variables at all measurement points.

Variable	T1		T2		T3		T4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Parental strain	3.97	1.03	3.23	1.18	3.22	1.17	4.09	0.96
Child emotional well-being	3.42	1.16	4.29	1.12	3.88	0.78	3.21	0.88
Child family-related well-being	4.25	1.10	4.04	0.85	3.96	0.65	3.84	0.94
Child problem behavior	3.44	1.85	2.86	1.64	2.69	1.64	3.42	1.82
Relationship quality (positive)	4.30	0.53	4.14	0.52	4.16	0.51	-	-
Relationships quality (negative)	2.73	0.50	2.80	0.51	2.77	0.52	-	-

Trajectories of key variables

Means of parental strain, child problem behavior, child emotional well-being and child family-related well-being across time are depicted in Figure 1. We examined trajectories of parent and child variables by fitting linear growth models (with intercepts and linear slopes) and quadratic growth models (with intercepts, linear and quadratic slopes). For the trajectory of *parental strain*, the quadratic growth model had an excellent fit with $\chi^2(1, n = 1769) = 0.41, p = .522$, RMSEA = .000, SRMR = .005, CFI = 1.00. Intercepts of the intercept factor ($b = 3.98, p < .001$), linear slope factor ($b = -1.17, p < .001$), and quadratic slope factor ($b = 0.40, p < .001$) were significant. The significant quadratic slope factor means that, on average, parental strain follows quadratic growth across measurement points. Likewise, variances of the intercept factor ($b = 0.54, p = .001$), linear slope factor ($b = 0.56, p = .013$), and quadratic slope factor ($b = 0.06, p = .003$) were significant, speaking for interindividual differences in the rate of change. In comparison, fitting a linear growth model resulted in negative estimated variances and thus in no interpretable model.

For the trajectory of *child problem behavior*, the quadratic growth model had an excellent fit with $\chi^2(1, n = 1769) = 2.64, p = .104, RMSEA = .030, SRMR = .015, CFI = .998$. Intercepts of the intercept factor ($b = 3.46, p < .001$), linear slope factor ($b = -0.97, p < .001$), and quadratic slope factor ($b = 0.32, p < .001$) were significant. Across individuals, the trajectory in child problem behavior across measurement points thus follows quadratic growth. Likewise, variances of the intercept factor ($b = 2.69, p < .001$), linear slope factor ($b = 1.10, p = .012$), and quadratic slope factor ($b = 0.11, p = .001$) were significant, speaking for interindividual differences in the rate of change. Fitting a linear growth model only resulted in negative estimated variances and thus in no interpretable model.

For the trajectory of *child emotional well-being*, the quadratic growth model had an acceptable fit with $\chi^2(1, n = 1769) = 56.99, p < .001, RMSEA = .178, SRMR = .069, CFI = .790$. Intercepts of the intercept factor ($b = 3.49, p < .001$), linear slope factor ($b = 0.90, p < .001$), and quadratic slope factor ($b = -0.33, p < .001$) were significant. Likewise, variances of the intercept factor ($b = 0.32, p = .049$), linear slope factor ($b = 0.44, p = .045$), and quadratic slope factor ($b = 0.06, p = .010$) were significant. These findings speak for quadratic growth across individuals and interindividual differences in the rate of change. Fitting a linear growth model revealed no interpretable model.

For the trajectory of *child family-related well-being*, the quadratic growth model had a good fit with $\chi^2(1, n = 1769) = 1.83, p = .176, RMSEA = .022, SRMR = .012, CFI = .996$. Intercepts of the intercept factor ($b = 4.24, p < .001$) and the linear slope factor ($b = -0.19, p = .004$), but not the quadratic slope factor ($b = 0.02, p = .225$) were significant. The non-significant quadratic factor suggests that the average intraindividual change is not described by a quadratic parameter. The variance of the intercept factor ($b = 0.46, p = .007$), but not of the linear slope factor ($b = 0.31, p = .126$) and quadratic slope factor ($b = 0.03, p = .095$) were significant, speaking for no interindividual differences in the rate of change in a quadratic model. Fitting a linear growth model resulted in negative estimated variances and thus no

interpretable model. Since the descriptive pattern of means across times clearly suggested a linear trajectory for family-related well-being, we additionally computed dependent sample t-test on the non-imputed data to compare family-related well-being between measurement points. Family-related well-being decreased significantly from T1 to T2, $t(859) = 4.27, p < .001$, from T2 to T3, $t(494) = 2.01, p = .045$, and from T3 to T4, $t(474) = 2.17, p = .030$. This pattern suggests on average linear decrease in family-related well-being.

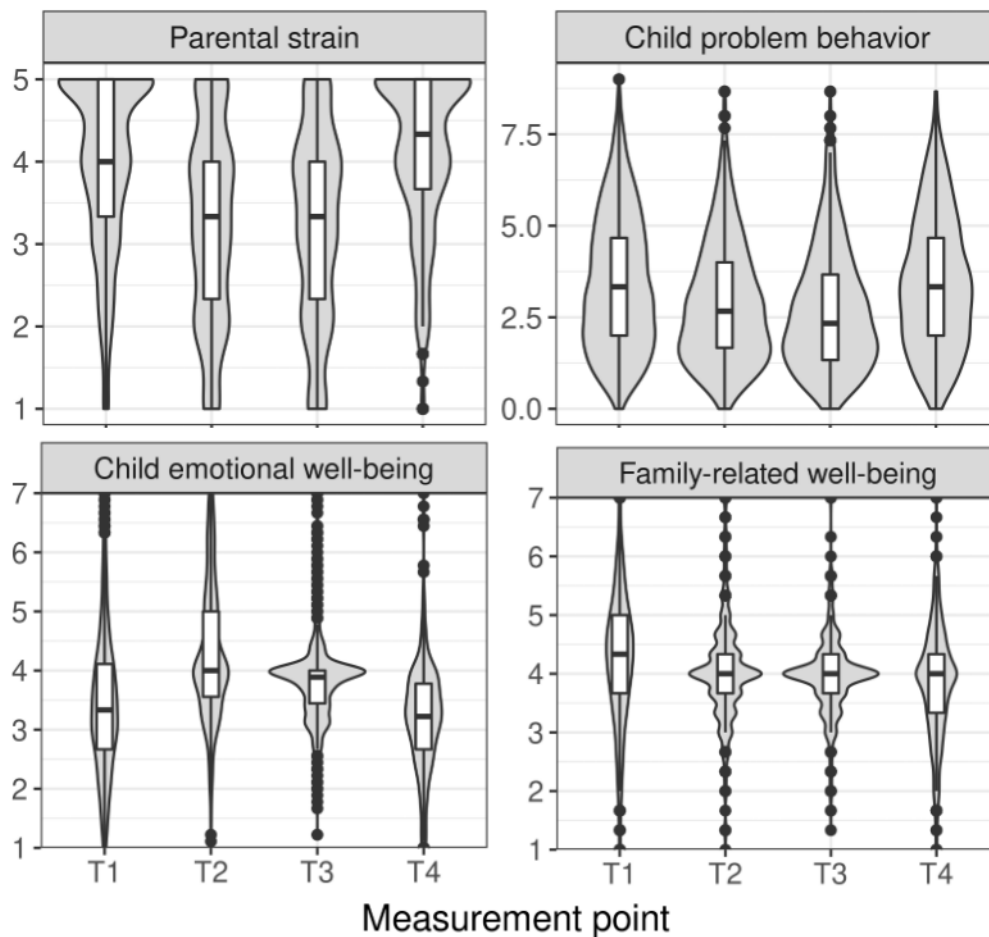


Figure 1. Trajectories of parental strain, child problem behaviors, child emotional well-being, and child family-related well-being across the four measurement points. Violin plots depict the distribution and boxplot of each variable at each measurement point.

True Intraindividual Change Models

In order to predict changes between measurement points, we computed one TIC Model for each child variable (problem behavior, emotional well-being, family-related well-being). As outcome variables, we predicted the change from T1 to T2 and from T3 to T4 of the respective child variable within the same model. As predictors for the change from T1 to T2, we considered the respective child variable at T1 as well as parental strain, positive relationship quality, and negative relationship quality at T1. As predictors for the change from T3 to T4, we considered the respective child variable at T1 and parental strain at T1 (as control variable) as well as parental strain, positive relationship quality, and negative relationship quality at T3. Parameter estimates for all models are presented in Table 3. An overview of the results is depicted in Figure 2.

Table 3

Means (M) and standard deviations (SD) for the key variables at all measurement points.

	T1 → T2			T3 → T4		
Variable	β	SE	<i>p</i>	β	SE	<i>p</i>
	Child problem behaviors					
Child problem behav. T1	-0.52	0.12	<.001	0.09	0.09	.026
Parental strain T1	-0.32	0.06	<.001	0.12	0.05	.010
Positive rel. quality T1	0.01	0.02	.412	-	-	-
Negative rel. quality T1	-0.02	0.02	.070	-	-	-
Parental strain T3	-	-	-	0.08	0.05	.096
Positive rel. quality T3	-	-	-	-0.02	0.02	.181
Negative rel. quality T3	-	-	-	0.02	0.02	.216
	Child emotional well-being					
Child emotional w.-b. T1	-0.67	0.07	<.001	0.21	0.04	<.001
Parental strain T1	0.32	0.05	<.001	-0.17	0.03	<.001
Positive rel. quality T1	-0.01	0.01	.310	-	-	-

Negative rel. quality T1	-0.02	0.01	.055	-	-	-
Parental strain T3	-	-	-	-0.07	0.03	.031
Positive rel. quality T3	-	-	-	0.02	0.01	.382
Negative rel. quality T3	-	-	-	-0.05	0.01	.049

Child problem behaviors. The model revealed an acceptable model fit with RMSEA = .08, SRMR = .16, CFI = .86. Child problem behavior and parental strain at T1 negatively predicted the change in problem behavior from T1 to T2 and positively predicted the change in problem behavior from T3 to T4. That means, the greater child problem behavior and the greater parental strain at T1, the greater the decrease in child problem behavior from T1 to T2 and the greater the increase from T3 to T4.

Child emotional well-being. The model revealed an acceptable model fit with RMSEA = .07, SRMR = .09, CFI = .85. Child emotional well-being at T1 negatively predicted the change from T1 to T2 and positively predicted the change from T3 to T4. That is, the lower emotional well-being at T1, the greater the increase in emotional well-being from T1 to T2 and the greater the decrease from T3 to T4. Parental strain at T1 positively predicted the change from T1 to T2 and negatively predicted the change from T3 to T4. That means, the greater parental strain at T1, the greater the increase in child emotional well-being from T1 to T2 and the greater the decrease from T3 to T4. Additionally, parental strain at T3 and negative relationship at T3 negatively predicted the change from T3 to T4, meaning the greater parental strain and negative relationship quality at T3, the greater the decrease in child emotional well-being from T3 to T4.

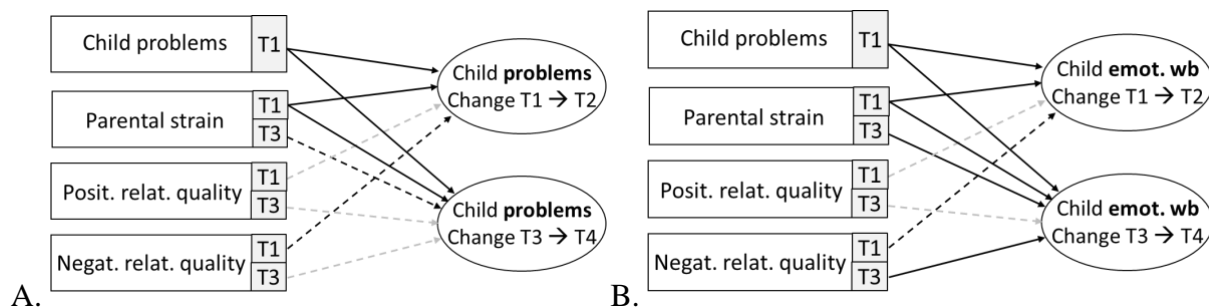


Figure 2. Results of the True Intraindividual Change Models, predicting individual change in child problem behavior (A) and child emotional well-being (B) from T1 to T2 and from T3 to T4. Solid arrows: $p < .05$; dashed arrows (black): $p < .10$; dashed arrows (grey): $p > .10$

Exploratory analyses on family-related well-being during the second lockdown

Descriptives of family-related well-being (Figure 1) are suggestive for greater interindividual variance during periods of lockdowns (T1, T4) compared to periods of loosened restrictions (T2, T3). Some families even seem to have higher family-related well-being during lockdown (T4) compared to pre-lockdown (T3). This is an interesting pattern to follow up as it could reveal which families do particularly well during a lockdown. To this end, we computed exploratory analyses to examine characteristics of families who did better during lockdown compared to pre-lockdown periods. We split families in two groups: families who reported increased family-related well-being (difference score $T4-T3 > 0$, $n = 174$) were compared against families who reported equal or decreased family-related well-being (difference score $T4-T3 \leq 0$, $n = 301$). Independent sample t -tests suggest that families differed with regard to age of the child reported on and number of children living in the household. Families who reported increased well-being during lockdown compared to pre-lockdown reported on average on younger children ($M = 5.5$, $SD = 2.0$), $t(473) = 2.01$, $p = .045$, and showed a tendency to having less children ($M = 1.9$, $SD = 0.6$), $t(473) = 1.76$, $p = .079$, compared to families who reported equal or decreased family-related well-being (age: $M = 5.9$, $SD = 2.0$; children in household: $M = 2.0$, $SD = 0.7$). These findings suggest that occasionally small families with young children also profitted from the lockdown period. Notably, this analysis was exploratory and needs further confirmatory investigation.

Discussion

The current study investigated child psychological well-being and mental health during the COVID-19 pandemic across four measurement occasions relying on a naturalistically occurring A (lockdown) – B (relaxation) – B (relaxation) – A (lockdown) quasi-experimental design. This

allowed us to differentiate long-term (i.e., of the pandemic generally independently of lockdowns) from short-term effects (i.e., specific effects of lockdowns) on trajectories of child well-being. Importantly, our results demonstrate that adjustment trajectories vary by domain. While child problem behavior and emotional well-being recovered during relaxation periods (wave-like trajectory), child family related well-being steadily decreased over the course of the pandemic (linear trajectory). This suggests the presence of different change processes at the individual and social level. Parental stress emerged as risk factor amplifying negative effects of the pandemic on child psychological well-being. Importantly, low levels of negative aspects in the parent-child relationship quality constituted a protective factor buffering against pandemic related effects. Thus, the present study moves the field forward by differentiating short-term from long-term effects of the pandemic and by uncovering novel risk and resilience factors for trajectories of child well-being across lockdowns and relaxations.

Notably, our results point to the coexistence of short-term effects that quickly change as the situation evolves (e.g., child emotional well-being and problem behavior) and long-term effects of the pandemic that span periods of lockdowns and relaxations alike (e.g., family related well-being). The short-term effects underscore developmental systems theory (Lerner, 2006) highlighting the importance of friendships and peer relationships for child socioemotional adjustment in times of crisis (e.g., Hay et al., 2004; Laursen & Hartup, 2002). Friendships and peer interactions seem to constitute important sources of resilience that contribute to child well-being and coping in times where peer contact faces little restrictions. Contrastingly, the long-term effect suggests that during the first lockdown caregivers seemed to have had ample time and attention for their children resulting in an elevated family related well-being. However, this shared time might have decreased alongside with increasing pandemic-related frustration and insecurity as the pandemic dragged on, resulting in diminished levels of family related well-being at later measurement points (Brandstetter et al., 2022; Kupferschmidt, 2020). At the same time, some small families with young children were able to

profit from the second lockdown, possibly due to their increased resources for individual children and their lower reliance on educational institutions, especially schools. This relates well and extends previous longitudinal work largely investigating changes in child well-being and mental health from pre-pandemic to lockdown and from lockdown to relaxation (Berry et al., 2021; Brandstetter et al., 2022; Essler et al., 2021; Khoury et al., 2021; Ravens-Sieberer et al., 2021, 2022; Raw et al., 2021). Very few studies allowed for a more comprehensive picture. For example, Houghton and colleagues (2022) found longitudinal decreases in mental health particularly for adolescents without neurodevelopmental disorders. Yet, the study was restricted to adolescence, and our work goes beyond that by focusing on early and middle childhood. Thus, the present work is among the first to separate short-term from long-term effects of the pandemic on child psychological well-being by relying on a naturalistically occurring quasi-experimental design.

Further, our results indicate that parental stress longitudinally led to a greater improvement in child well-being from lockdown to relaxation and to a greater deterioration of child well-being going from relaxation to lockdown. This suggests that higher parental stress is associated with higher volatilities in child well-being trajectories and thus constitutes an important factor explaining interindividual differences in child coping with the COVID-19 pandemic. Specifically, parental stress seems to amplify the impact of the pandemic on child well-being. On the other hand, the parent-child relationship quality emerged as important resilience factor attenuating negative effects of the pandemic independent of parental stress. This resonates well with and extends previous longitudinal findings demonstrating the negative impact of parental stress and hostile parenting on child well-being during the pandemic (Essler et al., 2021; Khoury et al., 2021; Raw et al., 2021) and notions of close relationships as resilience factors (Cicchetti, 2010; Feinberg et al., 2022; Jones et al., 2022; Masten, 2018; Prime et al., 2020; Rutter, 2012). Thus, parental stress and the parent-child relationship quality

constitute key variables in explaining interindividual differences in child developmental trajectories.

Limitations and Conclusion

While the present work exhibits multiple strengths, there are some limitations and directions for future research to consider. First, the present study relied on parental reports as especially younger children (3- to 6-year olds) are limited in their cognitive abilities to accurately report on their general well-being and problem behavior. This is in line with in line with previous longitudinal work assessing the effect of the COVID-19 pandemic on younger children in large samples (Berry et al., 2021; Brandstetter et al., 2022; Raw et al., 2021; Waite et al., 2021). As educational institutions have largely reopened, future work should also include teachers' reports and assess behavioral indicators of child well-being in smaller samples requiring individual testing sessions. Second, cross-national samples are called for in order to get a more complete picture of the overall child psychological well-being trajectories during the COVID-19 pandemic.

In conclusion, the current study is among the first to offer crucial evidence on the specific effects of lockdown measures on child psychological well-being and mental health during the COVID-19 pandemic in a naturalistically occurring quasi-experimental design. Taken together, the present work constitutes an important advancement of our efforts to gain a more complete picture of the effects of the COVID-19 pandemic on trajectories of child well-being.

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