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Impact of the COVID-19 Pandemic on the Health of Preschool Children: A Systematic Review

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ABSTRACT

This systematic review aimed to explore the impacts of the COVID-19 pandemic on the health of preschoolers. The search for articles covered the years 2020 to 2023 and was carried out in the Scielo and Pubmed databases with the following keywords: COVID-19 and Impacts in early childhood health; COVID-19 and early childhood mental health; COVID-19 and child health; COVID-19 and child mental health; COVID -19 and mental health and children; COVID -19 and anxiety and Sciences. A total of 34 articles on the subject were found. When assessing physical health, the reduced access to health services and vaccination/ immunization coverage was registered, as well as a greater chance of hospitalization in case of COVID-19 infection compared to adolescents; food insecurity, change in food regulation, increased use of screens/electronics, less frequent physical exercise and games, changes in sleep quality, abuse (physical and psychological) and neglect. For mental health, there is an increase in anxiety, stress, tiredness, depression, anguish, aggressiveness, irritability, and altered emotional regulation, in addition to the association of socioeconomic conditions with mental suffering. The COVID-19 pandemic had direct and indirect repercussions on the physical and mental spheres of child development, bringing about sudden changes in everyday life and the family environment.

Introduction

By July 2023, the COVID-19 pandemic had already impacted a staggering 767,972,961 individuals and tragically led to 6,950,655 deaths [1]. While children tend to be less severely affected and exhibit milder symptoms of the disease, its repercussions extend beyond physical health. The pandemic has triggered profound shifts in daily life and social interactions, influencing aspects such as the economy, social bonds, and mental well-being [2].

It is important to note that the age group of 0-6 years is marked by rapid individual development and distinct variations among infants. Consequently, the effects of the pandemic might have manifested differently within each family unit [3]. Notable among the direct consequences of the pandemic are social isolation, exacerbated challenges related to health determinants (financial strain, joblessness, and familial instability), food insecurity, and disruptions to daily routines and schooling. These circumstances categorize children as a vulnerable demographic [4].

The family environment emerged as a potential catalyst for inducing stress in children. The psychological well-being and stress levels of parents have played a role in the emotional distress experienced by their children [5]. Moreover, instances of depressive emotions, anxiety, disruptions in sleep patterns, and shifts in emotional regulation have been documented among children [6,7].

Economic and financial uncertainties have cast a shadow over the emotional fabric of families, amplifying challenges such as heightened unemployment rates and increased financial and job insecurities [8,9]. These vulnerabilities within families have further exacerbated issues like food insecurity and regulatory struggles [8]. Furthermore, access to healthcare has undergone significant disruptions. Urgent and emergency medical services were prioritized for COVID-19 cases, resulting in periods of complete suspension, followed by partial suspension of services for other health needs. Even after a return to relative normalcy, the public's demand for medical care remained tempered by concerns of potential contagion. One measurable consequence of these dynamics is the decline in vaccination coverage among the pediatric population [10,11]. It becomes evident that the COVID-19 pandemic has instigated far-reaching changes in lifestyles, daily routines, and socioeconomic conditions for the populace, including unique implications for preschool-aged children. Consequently, the focus of this study is to conduct

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a systematic review encompassing the direct and indirect repercussions of the COVID-19 pandemic on the health and well-being of preschool-aged children.

Methodology

A systematic literature search was carried out in February 2023 in the Scielo and Pubmed databases. The following inclusion criteria were established: articles aged 0-6 years and publications between 2020 and 2023. As exclusion criteria, in addition to those mentioned above, articles from the narrative or systematic literature reviews were removed; case reports; articles with conflicts of interest, critical commentary, editorials, and program and policy presentations.

In Pubmed, a search using the keywords "COVID-19 and Impacts in early childhood health" and "COVID-19 and early childhood mental health" yielded a total of 334 articles on the subject. Concurrently, on the Scielo platform, various combinations of keywords were employed, including "COVID-19 and Children's health", "COVID-19 and Child Mental Health," "COVID-19 and Mental Health and Children," and "COVID-19 and Anxiety and Children." The detailed process for assembling the references featured in this study is outlined in Figure 1.

The isolate was confirmed by serological typing with polyvalent Salmonella O, monovalent O9, Hd and Vi antisera as Salmonella enterica serotype Typhi [3,5,6]. Antimicrobial susceptibility testing revealed the isolate to be sensitive to Ceftriaxone (MIC <=0.25µg/ml), Ciprofloxacin (<=0.06µg/ml) but resistant to Cotrimoxazole [7]. Imaging studies, including abdominal ultrasound confirmed bilateral nephrocalcinosis (Figure 2) [4].

Results

A total of 34 articles on the subject were located. The main impacts of the COVID-19 pandemic on preschoolers can be divided into physical health and mental health. Regarding physical health, noteworthy impacts encompassed a decrease in healthcare access and vaccination/immunization rates, an elevated susceptibility to COVID-19-related hospitalization in comparison to adolescents, instances of food insecurity, alterations in dietary habits, heightened engagement with screens and electronic devices, reduced participation in physical activities and games, changes in sleep patterns, incidents of both physical and psychological abuse, as well as neglect. These findings were underscored across multiple sources [10,12-34].

Conversely, in the realm of mental health, a distinct set of outcomes emerged. These encompassed heightened levels of anxiety, stress, fatigue, depression, emotional distress, aggression, irritability, and shifts in emotional regulation. These effects extended to both the family unit and the children themselves. Furthermore, a connection between socio-economic circumstances (such as income, place of residence, household size, and educational level) and the prevalence of mental disorders was discerned. It became evident that the emotional well-being of parents significantly influenced the emergence of anxiety and stress in preschoolers. Additionally, it was noted that parental emotional states contributed to the weakening of the parent-child bond [12,16-39].

Table 1 summarizes the studies and their main results, based on searches carried out in the PubMed and Scielo databases using the keywords described in the methodology.

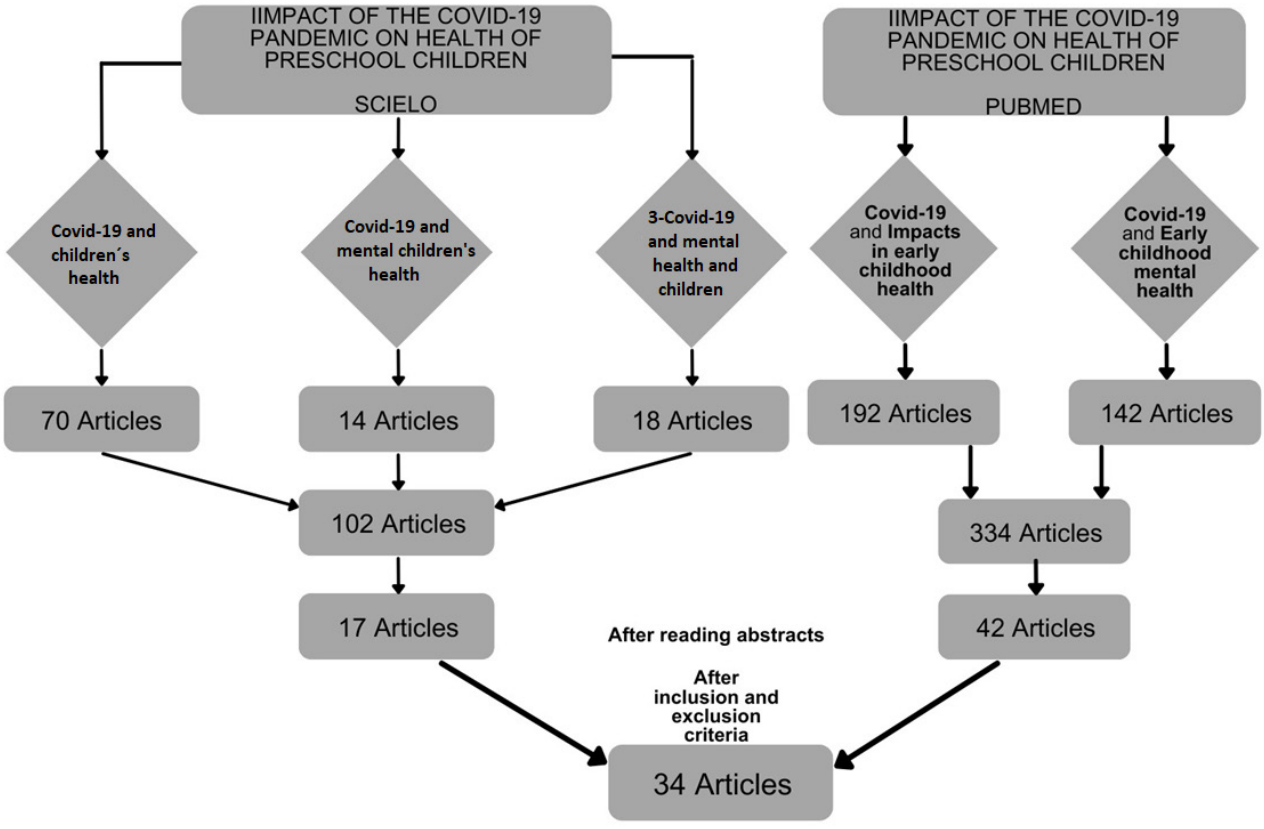

Figure 1: Flow Chart - Methodology of Systematic Research.

Table 1: Studies that analyzed the Impacts of the pandemic on the general health of preschoolers (0-6 years old) in Brazil and in the world – 2020-2023

Author and year of publication	Local	Population (n)	Design and research instrument	Aim	Main Results
Sama BK, Kaur P, Thind PS, Verma MK, Kaur M, Singh DD. (2020) 12	Districts of Punjab, India (Ludhiana, Sahibzada Ajit Singh (SAS) Nagar, Sangrur, Ferozepur)	310 parents of children	Cross-sectional study with own instrument	Understanding the impacts of lockdown on the behavior of children living in Punjab (India)	Anxiety, depression, anger, and irritability in children were associated with the locality of residence, low socioeconomic status, and maternal educational qualification. Eating disorders, increased weight, and electronic device usage time were observed. A higher number of children in the family was linked to increased screen time. Maternal higher education correlated with lower child illness.
Susilowati IH, Nugraha S, Alimoeso S, Hasiholan BP. (2021) 13	Singapore, Malaysia, Indonesia, Taiwan, Thailand, China, India, South Korea, Egypt, United Arab Emirates, and Japan.	951 parents or guardians of preschoolers (2-6 years old)	Cross-sectional with na online questionnaire (SMALLQ)	Determining digital media usage time and its impact on preschoolers during the pandemic.	Increase in cellphone usage (91.6%). Decrease in sleep quality (60.2%), lack of exercise and playtime (62.5%), exposure to inappropriate content (62.2%), and decreased parent-child interaction (62.5%).
Lafave LMZ, Webster AD, McConnell C, Van Wyk N, Lafave MR. (2021) 14	Alberta, Canada	34 Early childhood education centers and 238 children (3-5 years old)	Cross-sectional with Creating Healthy Eating and Activity Environments Survey (CHEERS) tool; Mindful Eating Questionnaire (MEQ)	Investigating the impact of COVID-19 and its guidelines on nutrition and physical activity in Early Childhood Education Centers (ECEC).	The healthy eating environment subscale showed a statistically significant difference between 2019 and 2020. Sedentary time was lower, while moderate and vigorous physical activity and step counts were higher. Nutrition improved during COVID-19.
Burt JF, Ouma J, Lubyayi L, Amone A, Aol L, Sekikubo M et al (2021) 15	Kampala, Uganda	14401 prenatal visits, 33499 deliveries, 111658 child services, and 57174 reproductive service visits.	Retrospective Observational (hospital record data)	Quantifying the indirect impact of COVID-19 on maternal, neonatal, and child health at KNRH Hospital in Kampala, Uganda.	Reduction in immunization and treatment for pneumonia, diarrhea, and malaria. Neonatal mortality has increased, and the number of children treated for malnutrition has also risen.
Okely AD, Kariippanon KE, Guan H, Taylor EK, Suesse T, Cross PL, et al. (2021) 16	Vietnam, USA, Sri Lanka, Spain, Pakistan, China, Hong Kong, Australia, Bangladesh, India, Indonesia, Malaysia, Switzerland, and Morocco.	948 parents or guardians of children (ages 3-5 years)	Longitudinal (telephone or online interviews with a proprietary instrument)	Examine how the pandemic has influenced physical activity, sedentary behavior, screen time, and sleep in preschoolers compared to the pre-COVID period.	One-third of parents experience higher stress and fatigue than before the pandemic. Screen time has increased by 55 minutes beyond the WHO's recommendations. There is a decrease in children's sleep duration. Outdoor time has decreased by 81 minutes on weekdays and 105 on weekends.
Bimpong KA, Nuertey BD, Seidu AS, Ajinkpang S, Abdul-Mumin A. (2021) 11	Ghana, Africa	Vaccination coverage data (up to 18 months)	Mixed-methods study (qualitative and quantitative - proprietary instrument)	Examine the impact of the pandemic on preschool vaccination services.	A decline of 38.3% in coverage. Fear of infection and misinformation were identified as reasons for the decline.

Steinberg S, Liu T, Lense MD. (2021) 17	United States and Canada	177 parents of children (6-70 months)	Cross-sectional study using standardized MusicHome scale and Likert scale; Postnatal Attachment Questionnaire (PAQ); Kessler Screening Scale for Psychological Distress (k6); Family Activities Questionnaire (FAQ)	Assess whether musical engagement between parents and children is associated with children's bonding and emotions.	Music was effective in regulating children's emotions and promoting attachment between parents and children.
Frankel LA, Kuno CB, Sampige R, (2021) 9	Houston, EUA	119 parents of children (Average of 4.5 years)	Cross-sectional study using State-Trait Anxiety Inventory (STAI); Patient Health Questionnaire (PHQ-4); The eight-item Self-Regulation in Eating Scale.	Examine the relationship between parental stress caused by COVID-19 and the eating behaviors of preschoolers.	The higher the parental stress, the lower the regulation of eating. Increased anxiety was associated with a greater imbalance in appetite perception. Educational level was linked to both personal and child's eating regulations.
Wei Y, Wang L, Zhou Q, Ta L, Xiao Y. (2021) 18	China	8119 mothers of children (3-6 years old)	Cross-sectional study using the Symptom Checklist 90 and the Child Negative Emotion Questionnaire, along with a proprietary instrument.	Identify the relationship between negative emotions in preschoolers and the mental health of their mothers.	Negative emotions in children were higher in boys and among only children. These emotions were more pronounced at ages 3 and 4. Negative emotions in children were associated with maternal mental health.
Traube D, Gozalians S, Duan L. (2021) 19	Los Angeles	171 home visitors and 75 supervisors	Cross-sectional study using a proprietary instrument, along with the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder Assessment (GAD-7).	Explore factors of virtual home visitation and rates of mental health referrals among families before and after the pandemic.	There is a higher prevalence of maternal anxiety and depression, and family referrals have decreased.
Saleem S, Burns S, Falenchuk O, Varmuza P, Perlman M. (2021) 20	Toronto, Canada	183 mothers of children (average age of 5.31 years)	Longitudinal study Instrument: Cohen Perceived Stress Scale (PSS-4); Generalized Anxiety Disorder Scale (GAD-2); Patient Health Questionnaire (PHQ-2); Social Support Questionnaire-Short Form (SSQ-6); Strengths and Difficulties Questionnaire (SDQ).	Investigate whether prior stability and social support can act as protective factors against the adverse effects of the pandemic on the mental health of mothers and children.	Mothers experienced significant declines in mental health. For children, having a stable history of education and care was associated with better mental health. Gender and maternal education were linked to children's mental health.
Cavalcante ANM, Tavares LVS, Bastos MLA, Almeida RLF. (2021) 21	Ceará, Brazil	48002 suspected cases of COVID-19 in children and adolescents.	Descriptive cross-sectional study using a proprietary instrument.	Describing the epidemiological profile of children and adolescents reported with COVID-19 in Ceará.	Newborns, infants, and preschool-age children showed a higher likelihood of hospitalization compared to adolescents.
Diniz E, Brandão T, Manteiro L, Veríssimo M. (2021) 22	Porto and Lisbon - Portugal	163 parents/ guardians (Children with an average age of 6 years)	Cross-sectional study - Marital satisfaction was measured with the Relationship Assessment Scale (RAS); Social Competence and Behavior Evaluation Scale (SCBE); Self-efficacy for Parenting Tasks Index – Toddler Scale (SEPTI-TS).	Evaluate the effects of the child's socioemotional conjugal balance and test whether parental efficiency mediated this association during the lockdown.	Marital satisfaction was associated with parental effectiveness, the child's social competence, and lower child anxiety and irritability.

Bovell-Ammon A, Cuba SE, Lê-Scherban F, Rateau L, Heeren T, Cantave C, et al (2022) 23	Boston, Minneapolis, Philadelphia, and Little Rock - United States	1165 parents/ guardians of children (< 4 years old)	A longitudinal study involving participant interviews, U.S. Household Food Security Survey Module, and 3 items from the child scale for Child Food Insecurity.	Compare changes in experiences and difficulties before and during the pandemic in families with preschoolers, considering race, ethnicity, and nationality.	Increased child food insecurity and rent delays were significantly higher in families with Latina mothers and immigrant mothers.
Lópes-Morales H, Trudo RG, Del-Valle MV, Canet-Juric L, Biota M, Andrés ML et al (2022) 24	Argentina	105 mothers of infants (6 months old)	A longitudinal study using the C-PIQ questionnaire, Beck Depression Inventory-II, State-Trait Anxiety Inventory – STAI, and Infant Behavior Questionnaire-Revised – Very Short Form (IBQ-RVSF).	Analyze the negative effects of the pandemic on prenatal anxiety and depression, as well as on the temperament of babies.	Decreased child affectivity and maternal anxiety during the 2nd and 3rd trimesters of pregnancy were observed. No effects were observed on the child's need for control or sleep disturbances.
MacDonald SE, Paudel YR, Kiely M, Rafferty E, Sadatangani M, Robinson JL et al (2022) 25	Alberta, Canada	114.178 children (2019 cohort) and 106.530 children (2020 cohort)	Retrospective cohort study (Immunization and Adverse Reaction to Immunization – Omm/ARI)	Identify the impact of COVID-19 on the vaccination coverage of preschoolers.	In 2020, there was a decline of 9.9% in the vaccination coverage for MMRV (measles-mumps-rubella-chickenpox) and MMR (measles-mumps-rubella) vaccines.
Picca M, Manzoni P, Corsello A, Ferri P, Bove C, Braga P et al (2022) 26	Lombardy, Italy	1688 children (1-5 years old)	Cross-sectional study (two periods: 2020 and 2021, using a proprietary instrument)	Evaluate behavioral changes in children 1 year after the 2020 lockdown.	Increases in irritability and tantrums. Children who attended schools reduced their screen time. Parental education level was associated with lower screen time for children.
Kiely M, Mansour T, Brosseau N, Rafferty E, Paudel YR, Sadarangani M et al. (2022) 27	Quebec, Canada	200.901 children in 2019 and 198.477 children in 2020.	Cohort study (3, 5, 13, and 19 months of age) - Vaccination records	Evaluate the impact of the pandemic on vaccination routines in 2019 and 2020.	Vaccination coverage decreased in all cohorts. The greatest impact was observed in the 19-month cohort.
Ellithorpe ME, Aladé F, Adams RB, Nowak GJ. (2022) 28	United States	682 parents or guardians of children aged 5 years or younger.	Cross-sectional study - proprietary instrument	Examine demographic aspects and previous vaccination behavior about COVID vaccination and perception of severity.	Better vaccine acceptance was associated with a perception of disease severity. Higher-income and educational levels were associated with greater adherence. Parents with prior COVID experience and who vaccinated their children against the flu had a higher perception of disease severity.
Ji C, Piché-Renaud PP, Apajee J, Stephenson E, Forte M, Friedman JN, et al. (2022) 29	Ontario, Canada	12,313 children (up to 2 years old).	Observational retrospective cohort study (using the Utopian database).	Determine the change in vaccination coverage in children up to 2 years old, comparing pre- and post-pandemic periods.	The greatest decreases in coverage were observed in the 15-18 months age group, with declines of 14.7% and 16.4%. Children living in lower-income neighborhoods and with greater ethnic diversity showed lower coverage rates across all ages.
Tso WWY, Chan KL, Lee TMC, Rao N, Lee SL, Jiang F, Chan SHS, et al. (2022) 10	Hong Kong	Parents of 417 children with special needs (SN) and of 25,427 children without special needs (non-SN).	Cross-sectional study (Online questionnaire; The Strength and Difficulties Questionnaire - SDQ; Quality of Life Inventory 4.0 Generic Core Scales - PedsQL; Parental Stress Scale - PSS; Parent-child Version - CTSPC).	Investigate the mental health and risk of maltreatment in children with special needs (SN), and how school closures and reduced access to medical and rehabilitative services have affected this population.	Children with special needs had: more hours of screen time for entertainment and less for learning. They slept less, experienced more emotional and behavioral difficulties, and had lower quality of life compared to children without special needs. Parental stress was associated with lower quality of life, less physical activity time, and more electronic device usage. Physical and psychological maltreatment and neglect were also associated with these factors.

Buechel C, Nehring I, Seifert C, Eber S, Behrends U, Mall V; Friedmann A. (2022) 30	Bavaria, Germany	991 parents of children (0-3 years old).	Cross-sectional study (questionnaire: Parenting Stress Index - PSI; Questionnaire for Crying, Sleeping, and Feeding - CSF; State-Trait Anxiety-Depression Inventory - STADI; Strengths and Difficulties Questionnaire - SDQ).	Explore the presence and extent of parental and child stress factors in families from Germany with children aged 0-3 years during the COVID-19 pandemic.	Children showed higher frequencies of crying, sleep problems, and feeding issues, correlated with parental stress and parental affectivity. Lower-income, higher education level, and increasing child's age were related to higher parental stress and affectivity.
Galbally M, Watson SJ, Lewis AJ, Ijzendoorn MH. (2022) 31	Melbourne, Australia	468 mothers of children (3-4 years old).	Cohort study - 3-4 years postpartum (Structured Clinical Interview for DSM-IV - SCID-IV; Edinburgh Postnatal Depression Scale - EPDS; Child Behavior Checklist - CBCL; Preschool Age Psychiatric Assessment - PAPA).	Examine the mental health of mothers and children and its impact on motherhood in the context of the pandemic.	There was an increase in depressive symptoms among mothers, particularly pronounced in those who had previous symptoms of depression before this period. There were no increases in parental stress or child behavioral problems.
Zhang L, Cao H, Lin C e Ye P. (2022) 32	Hubei, China	16161 families with children (3-6 years old).	Cross-sectional study (proprietary questionnaire); Parenting style was assessed using the Parenting Styles and Dimensions Questionnaire (PSDQ); Preschool Anxiety Scale (PAS).	Evaluate the association between parental investment and parenting style, socioeconomic status of families, and children's anxiety during the pandemic.	Families with shorter and longer quarantine times had socioeconomic status negatively associated with authoritarian parenting. Socioeconomic status was negatively associated with child anxiety through authoritarian parenting.
Papadopoulos A, Nichols ES, Mohsenzadeh Y, Giroux I, Mottola MF, Lieshout RJ, et al. (2022) 33	Canada, the USA, the United Kingdom, India, and other countries in Europe, Asia, and South America.	117 mothers of infants (up to 2 months old).	A prospective study with a questionnaire (time 1 = pregnancy, time 2 = 2 months postnatal) - Barratt Simplified Measure of Social Status (BSMSS); Perceived Stress Scale (PSS), Edinburgh Perinatal/ Postpartum Depression Scale (EPDS); and Gross and Fine Motor Scale	To examine the association between prenatal and postpartum and maternal stress and depression in the motor development of children up to 2 months of age.	Higher levels of prenatal and postpartum maternal depression were associated with worse infant motor outcomes in the first 2 months of life. Infants most at risk of atypical motor development were born prematurely and with low birth weight
Edgcomb JB, Benson NM, Tseng C, Thiruvalluru R, Pathak J, Bussing R, et al (2022) 34	California, Florida, Massachusetts, e Nova York	Emergency visits to children aged 3-17 years (5228 in 2019 and 3892 in 2020)	Cross-sectional cohort study - database	To measure emergency trends in child mental health care services during the 1st wave of covid.	Reduction in consultations for the preschool age group compared to the pre-pandemic period, in visits for attention deficit and hyperactivity disorders;
Maciel ELN, Jabor PM, Gonçalves Jr. E. (2022) 35	Espírito Santo, Brazil	27351 COVID-19 notification records (0-19 years old)	Descriptive observational, secondary data	Characterize the profile of children, adolescentes, and young people of school age and associations with the positive result of the COVID-19 test	Being white and aged between 5 and 14 increased the chances of testing positive for COVID-19. Living in the interior and having a disability increase the chances of the disease. Mortality was higher among blacks/browns.
Costa P, Forni E, Amato I, Sassaki RL. (2022) 36	São Paulo, Brazil	108 mothers (children 0-35 months)	Cross-sectional - questionnaire with items from the “protection and safety” domain of the Early Childhood for Healthy Adults instrument (PIPAS); Caregiver Reported Early Development Instrument – CREDI	Identify risk and protective factors for the development of preschool children during the pandemic.	The family participating in an income transfer program and the child living with grandparents are protective factors for child development. The fact that the family was headed by a woman was identified as a risk factor.

Koerber MI, Mack JT, Seefeld L, Kopp M, Weise V, Starke KR et al (2023) 37	Germany, city of Dresden, and surroundings.	380 parents (children averaging 21.5 months)	Cross-sectional (Effort-Reward Imbalance Questionnaire (ERI); Postpartum Bonding Questionnaire (PBQ); Edinburgh Postnatal Depression Scale (EPDS) and Symptom-Check-List-90-R (SCL-90-R)	To examine the association between psychosocial work stress and parent bonding	Greater psychosocial stress at work is associated with less bonding between parents and children - symptoms of depression and parental aggression were associated with less bonding between parents and children.
Gueron-Sela N, Shalev I, Gordon-Hacker A, Egotuboc A, Barr R. (2023) 38	Israel	313 parents of children (2-5 years old)	Longitudinal (media questionnaire assessment (MAQ); Strengths and Difficulties Questionnaire (SDQ); and own instrument)	To examine longitudinal trajectories of preschoolers' media exposure time during lockdown and its association with post-lockdown behavior	Behavioral and emotional problems increased in children, associated with longer screen use to regulate distress in children. Maternal distress was associated with emotional problems in children.
Burns S, Jegatheeswaran C, Perlman M. (2023) 39	Toronto, Canada	375 families with children (4-6 years old)	Mixed cross-sectional (qualitative and quantitative) (questionnaire: Strengths and Difficulties Questionnaire (SDQ); Generalized Anxiety Disorder Scale (GAD-2); Patient Health Questionnaire (PHQ-2); Scale (GAD-2)	To study the effects of exposure to early childhood education centers and sociodemographic aspects of families.	80% of children faced educational challenges with differences between income and the number of adults in the home. Low-income families were less likely to complain about their children's socialization.

Discussion

The impact of the COVID-19 pandemic extends beyond its direct health implications, encompassing public health, socioeconomic disparities, and significant shifts in family dynamics. Within this intricate framework, preschool-age children have been exposed to profound transformations in their familial, social, and healthcare environments. This phase of early childhood holds exceptional importance for developmental trajectories, with the potential to influence outcomes well into adulthood [14,40].

As a result of the pandemic's containment and preventive measures, parents and guardians found themselves grappling with heightened household responsibilities and increased demands related to remote work and home obligations. This shift often led to exhaustion due to the amplified workload. Simultaneously, the prevailing climate of elevated financial and job insecurity added layer of stress to families [9,41,42]. Consequently, the stability of the familial core and the capacity for effective self-regulation in the face of stressors became contingent upon diminished well-being, accompanied by escalating feelings of discomfort and distress [9].

Mental health, therefore, presented variations and individual experiences in each family component. The pandemic increased the reports of anxiety, depression, and anguish [38,39]. In addition, access to health was reduced, as well as individual and family social assistance [20,43]. However, the family's financial status and work situation potentially provoked the experience of anxiety in preschool-aged infants [9]. Changes in daily life and parental stress were essential objects for establishing vulnerability in the mental health of children, who demonstrated less emotional resilience, worse quality of sleep and food regulation, and changes in sociability and autonomy [30,38,44].

It is understood that the situation generated new demands that permeate parental care in the sense of a more intense action that aims at attention and dialogue. More than that, the stress generated by the tension of remote work interferes with the weakening of the bond between parents and children, causing repercussions on child care [37]. Specifically in the dimension of emotionally negative sensations provoked in children, anxiety can generate behavior problems and hyperactivity [39]. In addition, anger, fear, tension, and obsessive-compulsive disorders, when experienced by children, potentially aggravate situations of maternal sensitivity and depression [18]. Children's mental suffering, however, was also associated with socioeconomic aspects such as income [12,32] and maternal education, generating depression, anger and irritation [12,20,45].

The socioeconomic vulnerability was felt mainly for the families that demanded financial support, with reports of negative changes also for the child's sleep pattern, as well as its duration and quality [16]. Especially for mothers, mental health had more intense repercussions according to the level of social support,20 age in the range of 30 years or less, education below elementary school, and with up to 2 children [45]. In addition, the feeling of burden was common in families managed only by the mothers [36]. In the case of pregnant women, impacts such as prenatal and postpartum depression have been reported [33].

Another issue of great importance is the increase in food insecurity [15,23], and deregulation in the supply of food with the increase in the intake of ultra-processed products, especially those that are easily accessible [44]. Weight gain and the onset of childhood eating disorders can also be favored [12]. At the same time, an increase in sedentary lifestyle was

observed among infants without access to school activities and a reduction in sedentary lifestyle among children who could access early childhood educational centers [14,16]. However, when considering an environment of family balance and marital satisfaction, greater household responsibility enabled a better relationship between parents/guardians and children, less mental suffering, and better social skills [22,44]. It is understood that positive family life and the context of environmental regulations provide safe child development.

Regarding the physical repercussions of the emotional and mental sphere, the chances of abuse (physical, psychological), negligence, and reduction in the children's quality of life were associated with experiences of parental stress [10]. Furthermore, the use of electronics and screens was widely disseminated. It is believed that the habit was encouraged not only in the face of remote education models [16], but also as a parental strategy for modulating and managing child anguish [38], anxiety, anger, and irritation [12]. This, however, was not the only measure used in the management of home stress. The habit of listening to music during this period resulted in better regulation of emotions, engagement in everyday life and educational efficiency, as well as providing positive reinforcement for the bond between parents and children and less distress in the family [17].

Access to health, in turn, acts as a key to biopsychosocial support in early childhood. There was a significant reduction in access associated with socioeconomic aspects such as income, ethnic diversity, education, and from feelings such as fear of infection during the pandemic [11,28,29]. Daily health care services such as home visits in primary care, childcare, mental health outpatient clinics, and social assistance programs underwent a significant interruption and affected not only early childhood but also basic and specialized care [43].

At the organizational level, the reduction in the functioning of the mental health care network had an impact on the reduction of diagnoses in children, in addition to increasing the vulnerability of those who previously already had ongoing treatments in specialized centers [34]. Also noteworthy is the decrease in vaccination coverage. For the preschool age group 11,15, 25, and 27 and an increase in neonatal mortality rates, potentially related to the lower frequency of prenatal consultations during the period [15].

Given the above, the telemedicine service mitigated the situation of access to health by assuming and resolving part of a large number of demands through text messages and audio or video calls with health professionals [46,47].

Final Considerations

The COVID-19 pandemic had direct and indirect repercussions on the physical and mental spheres of child development, bringing about sudden changes in everyday life and the family environment. It was observed that the mental health of parents and guardians was intensely impacted by socioeconomic aspects and changes in routine. Consequently, many children experience anxiety, stress, anguish, and negative emotional changes. At the physical level, there was a reduction in access to health care, food insecurity, and vulnerability to abuse. Although there are relevant findings in the literature regarding the impacts on the general health of children, it should be considered that the pandemic is relatively recent, so more studies are still needed to establish associations between the period and the medium and long-term impacts on health childish.

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