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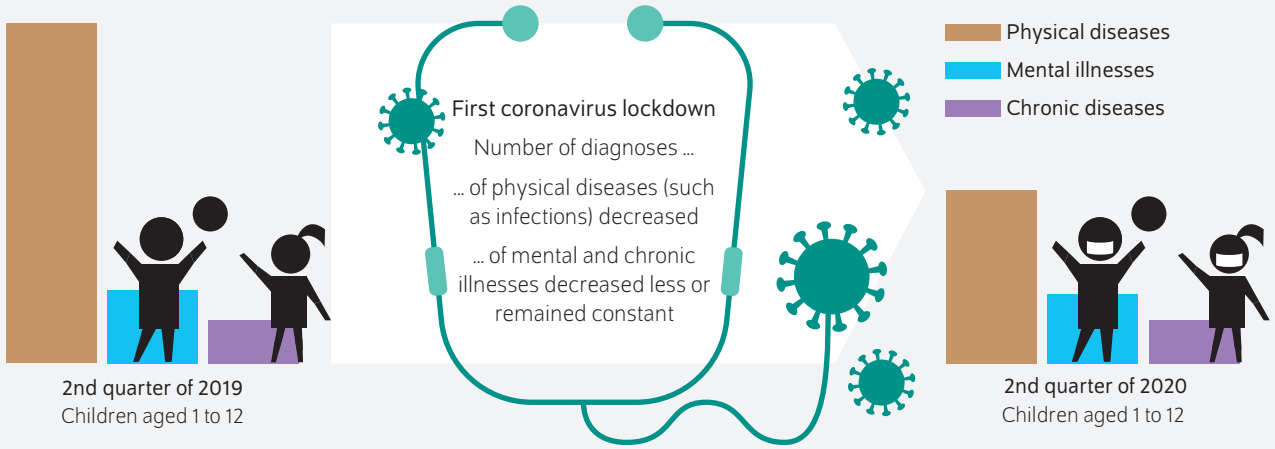
AT A GLANCE

Child health during the first coronavirus lockdown in Germany: fewer treatment cases and fewer diagnoses of infections

By Mara Barschkett and C. Katharina Spiess

- Study based on National Association of Statutory Health Insurance Physicians diagnosis data on almost 9.2 million children
- During the first coronavirus lockdown in spring 2020, treatment cases of children in outpatient care declined by up to 20 percent compared to 2019
- Above all, markedly fewer physical diseases such as infections were diagnosed in one- to 12-year-olds; decline in mental illnesses noticeably smaller
- Possible explanations include children actually getting sick less often due to the lockdown and contact restrictions and/or fewer physician visits to avoid infections
- More attention should be paid to protecting children's health in day care centers and schools so they can learn most effectively

During the first coronavirus lockdown in spring 2020, particularly fewer physical diseases such as infections were diagnosed in one- to 12-year-old children



Source: Authors' own depiction based on data from the National Association of Statutory Health In-surance Physicians (KBV).

FROM THE AUTHORS

"Generally, the coronavirus pandemic has many negative effects. However, one side effect may be that children were less likely to contract other infectious diseases during the first lockdown. We should continue to pay attention to protecting children's health once the pandemic is over." — ***Mara Barschkett, study author*** —

MEDIA

Audio Interview with Mara Barschkett (in German)
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Child health during the first coronavirus lockdown in Germany: fewer treatment cases and fewer diagnoses of infections

By Mara Barschkett and C. Katharina Spiess

ABSTRACT

During the first coronavirus lockdown in Germany in spring 2020, treatment cases of children in outpatient care declined by up to 20 percent. As this study based on administrative diagnosis data of all statutory health insurance companies in Germany shows, there were significantly fewer physical diseases, such as infections, diagnosed in one to 12-year-old children in the second quarter of 2020 compared to 2019. With more than 50 percent, the decline was the largest for one- to two-year-old children. It is possible that actually fewer children became sick due to the contact restrictions and the closure of day care centers and schools. However, it is also possible that in order to avoid the risk of infection, parents took their children to physician's offices less often unless it was absolutely necessary. The reduction in mental illness diagnoses was significantly smaller and the comparably constant figures for chronic diseases such as diabetes or celiac disease indicate that parents with chronically ill children did not forego necessary medical appointments. More attention should be paid to protecting children's health in day care centers and schools in the future, as good health is an important prerequisite for the ability to learn effectively. In addition, more attention should be paid to the current developments in child health, as it seems likely that health aspects, such as mental health, might deteriorate in the course of the pandemic.

According to the Robert Koch Institute (*Robert Koch-Institut*, RKI), the incidence of many infectious diseases that have to be reported markedly decreased over the course of the coronavirus pandemic in 2020.[1] Such statements mostly referred to the adult population. But how has the health of children developed during the pandemic? This question is relevant not only from a medical and health policy perspective but from an education policy perspective as well. It has been widely documented that the health of children is of central importance to their development and thus, from an education economics perspective, also to the human capital of the entire economy.[2] Children with health problems are generally unable to learn to the same extent as healthy children and are thus limited in their development. This disadvantage likely continues throughout their entire life and amplifies over time.[3]

Relevant publications indicate that clinical treatments of children and adolescents declined in spring 2020 during the first coronavirus lockdown. Hospital stays were delayed in many cases due to parents' fear of infection on the way to or at the hospital, among other reasons.[4] Overall, the number of hospital cases for children and adolescents decreased by 41 percent during the first lockdown.[5]

1 RKI analyses on the development of infectious diseases that have to be reported, such as chickenpox, show that the actual number of infections are 35 percent lower than the model-based expected number of cases, cf. Madlen Schranz et al., "Die Auswirkungen der COVID-19 Pandemie und assoziierter Public-Health-Maßnahmen auf andere meldepflichtige Infektionskrankheiten in Deutschland," *Epidemiologisches Bulletin des Robert-Koch-Instituts* 7 (2020): 3–7 (in German).

2 Cf. Janet Currie, "Child health as human capital," Health Economics, first published online on January 21, 2020 (available online; accessed on April 14, 2021. Accessed on August 30, 2020. This applies to all other online sources in this report unless stated otherwise).

3 Cf. for example Gabriella Conti, James Heckman, and Sergio Urzua, "The Education-Health Gradient," *American Economic Review* 100, no. 2 (2010): 234-238.

4 International studies also show this. For example, almost 30 percent of parents reported in a US survey in September 2020 that they had canceled physician office visits (for a check-up or due to acute symptoms) for their child due to fear of infection, cf. Dulce Gonzalez et al., *Delayed and Forgone Health Care for Children during the COVID-19 Pandemic* (Washington, DC: Urban Institute, 2021).

5 Cf. Kinder- und Jugendarzt, "Zahlen, Daten, Fakten: Corona-Delle auch bei Krankenhausfällen," no. 2 (2021): 114-115 (in German). International studies also document corresponding trends: A US study reports a 45.4 percent decrease in pediatric hospital admissions compared to the levels of previous years, cf. Jonathan H. Pelletier et al., "Trends in US Pediatric Hospital Admissions in 2020 Compared With the Decade Before the COVID-19 Pandemic," *JAMA Network Open* 4, no. 2 (2021): 12.

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Significantly fewer physician visits during first lockdown

As a result of the decline in hospital visits, there was an increase in complicated courses of chronic illnesses in children in German hospitals following the first lockdown, as reported, for example, by the health insurance company DAK in a special analysis.[6] This may be due to the fact that parents were less likely to take their children to outpatient physicians during the first lockdown. An evaluation of billing data of outpatient care physicians confirms this: The number of cases treated by physicians in child and adolescent medicine and psychologists fell by 45 to 53 percent in the second half of March 2020.[7]

The underlying reasons for the decline in physician visits during the first lockdown can be manifold. Closed playgrounds, the cancellation of recreational sports, home day care, home schooling, and the recommendation to reduce social contacts to the absolute minimum could have led to lower incidences.

However, relevant research on child and adolescent mental health, such as the COPSY study, indicates that mental stress has increased in children and adolescents.[8] The analysis of the COPSY data clearly shows that children and adolescents felt the mental stress of the coronavirus pandemic as early as 2020: Seventy-one percent of the children and adolescents surveyed were stressed by the pandemic. Two-thirds of them reported decreased quality of life and psychological well-being. Before the coronavirus pandemic, only one-third of children and adolescents reported this.[9] These findings refer to children aged seven to 17;[10] to the knowledge of the authors of this Weekly Report, there is not yet representative data on the mental health of younger children. Even less is known about physical diseases in children diagnosed by physicians outside hospitals. This is where this report, based on representative data from the National Association of Statutory Health Insurance Physicians (*Kassenärztliche Bundesvereinigung*, KBV) sets in (Box).[11] The data covers the time period from 2019 until 2020 during and shortly after the first lockdown.

Objective data on the health of over nine million children

The KBV data analyzed in this report contain information on nearly 9.2 million children and include all diagnoses made by outpatient physicians, which were passed on to the statutory health insurance companies as part of the billing process.[12] Thus, the data is not based on subjective information provided by parents. The children and their diagnoses contained in the data represent the population of all children who visited an outpatient physician at least once from January 2019 to June 2020.[13] Data from the second quarters of 2019 and 2020 are analyzed.

The data analyzed include diagnoses and treatment cases of children from one to 12 years old.[14] The children were divided into four age groups.

- Toddlers, one- to two-year-olds, 38.5 percent of whom attended a day care center in pre-pandemic times.[15]
- Preschool-aged children, three- to five-year-olds. Before the pandemic, 94 percent and thus almost all of them attended day care centers.[16]
- Elemenatry-school-aged children, six- to ten-year-olds.
- Pre-teens, older school-aged children from 11 to 12 years who generally still require care. Before the pandemic, 26 percent of them attended an after-school care program outside schools (Hort) and 23 percent took advantage of all-day school options.[17]

The diagnoses and treatment cases from the second quarters of 2019 and 2020 (April to June) are compared. Day care centers and schools were closed in mid-March 2020 and on March 23, 2020, the first nation-wide coronavirus lockdown began. On April 20, 2020, retail and other sectors gradually began reopening. From May 4, schools and day care centers were allowed to reopen under strict safety regulations. Thus, the dates from the second quarter of 2020 cover the period of the first lockdown and some of the following weeks. The data allow to account for characteristics of the children that correlate with their health, such as sex or age (Box). Furthermore,

6 Cf. Kinder- und Jugendarzt, "Zahlen, Daten, Fakten."

7 Cf. Sandra Mangiapane et al., *Veränderung der vertragärztlichen Leistungsinanspruchnahme während der COVID-Krise* (Zentralinstitut für die kassenärztliche Versorgung in Deutschland, 2020) (in German).

8 Cf. UKE Hamburg, *COPSY-Studie* (in German; available online). As a part of the COPSY study, 1,040 11- to 17-year-old children and adolescents as well as 1,586 parents of seven- to 17-year-olds across Germany were surveyed online. For a summary of other studies, cf. Robert Schlack et al., "Auswirkungen der COVID-19-Pandemie und der Eindämmungsmaßnahmen auf die psychische Gesundheit von Kindern und Jugendlichen," *Journal of Health Monitoring* 5, no. 4 (2021): 23–33 (in German).

9 Children and adolescents are experiencing increased psychological and psychosomatic issues during the pandemic: The risk of psychological problems increases from around 18 percent before the pandemic to 31 percent during the pandemic. Psychosomatic symptoms such as irritability, sleep issues, headaches, or stomachaches occurred significantly more often. Cf. Ulrike Ravens-Sieberer et al., "Mental Health and Quality of Life in Children and Adolescents During the Covid-19 Pandemic – Results of the Copsy Study," *Deutsches Ärzteblatt* 117 (2020): 828-829.

10 Studies in China and the United Kingdom, for instance, also show that children and adolescents who suffered from mental health problems (such as ADHD) before the pandemic are especially struggling due to the pandemic. The loss of school routines is a possible reason for this, cf. Joyce Lee, "Mental health effects of school closures during COVID-19," *The Lancet* vol. 4 (2020); Jinsong Zhang et al., "Acute stress, behavourial symptoms and mood states among school-age children with attention-deficit/hyperactive disorder during the COVID-19 outbreak," *Asian Journal of Psychiatry* (2020): 51.

11 The authors would like to thank the National Association of Statutory Health Insurance Physicians for providing the anonymized data. The present analyses are a part of the child health research conducted by the Education and Family Department at DIW Berlin and are the sole responsibility of the authors.

12 The study is based on data that is based on the database of claims of all publicly insured individuals in Germany as collected by the Association of Statutory Health Insurance Physicians and then forwarded to the National Association of Statutory Health Insurance Physicians

13 Thus, the data include almost all children with statutory health insurance, as children usually visit a physician at least once in a period of this length.

14 Physician visits in a child's first year of life are not recorded, as at this age medical expenses are often billed via the mother and children do not yet have their own health insurance card.

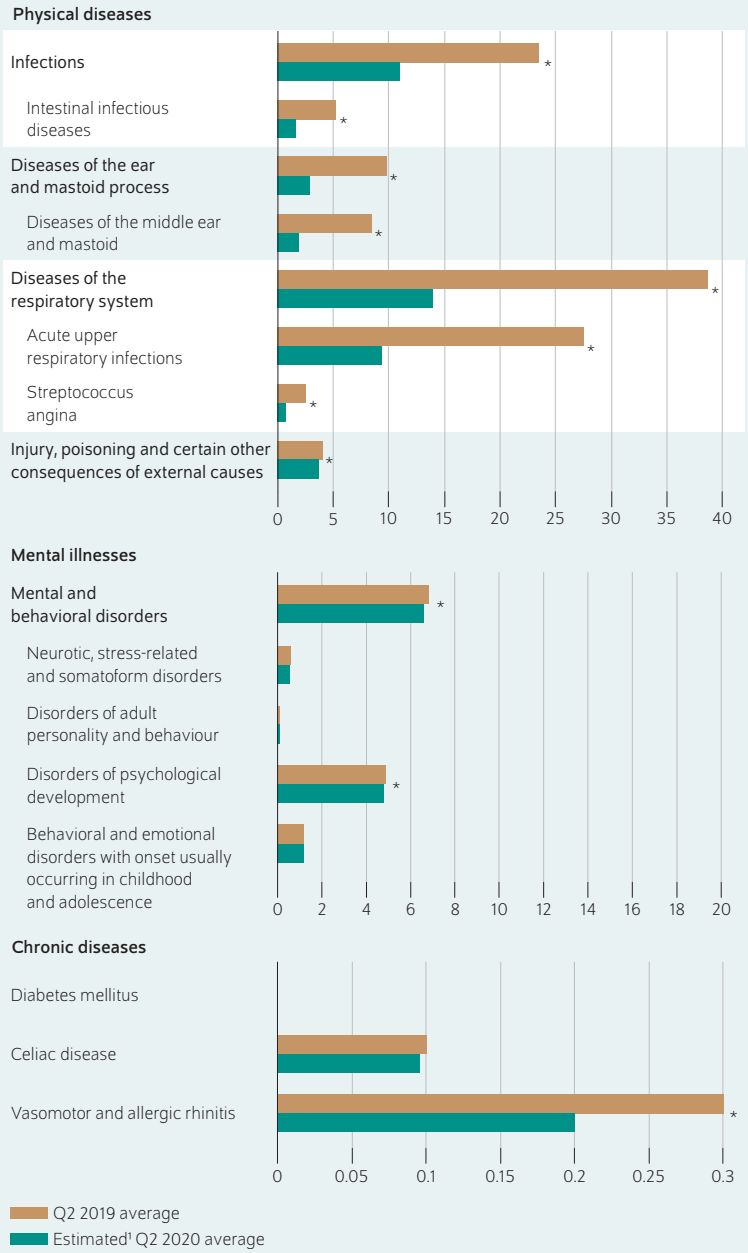
15 Autorengruppe Bildungsberichterstattung, *Bildung in Deutschland 2020. Ein indikatorengestützter Bericht mit einer Analyse zu Bildung in einer digitalisierten Welt* (2020) (in German).

16 Autorengruppe Bildungsberichterstattung, *Bildung in Deutschland 2020.*

17 Cf. for example Christian Alt et al., *DJI-Kinderbetreuungsreport 2018* (2018) (in German).

Figure 1

Sick one- and two-year-old children classified by selected diagnosis groups
Shares in percent



1 The estimated average is adjusted for the children's age, sex, and birth month as well as regional factors.

Legend: Almost 24 percent of one- and two-year-old children who are statutorily (publicly) health insured and had at least one outpatient care visit between January 2019 and June 2020 were diagnosed with an infection in the second quarter of 2019. A year later in the second quarter of 2020, the share was about half as large.

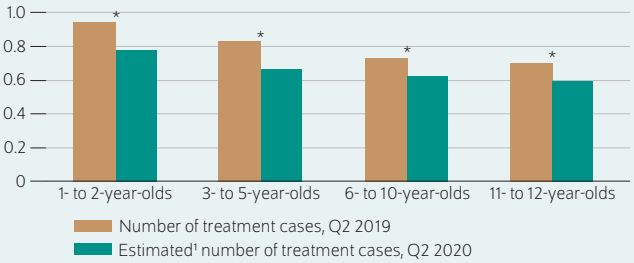
Note: It is possible for a child to be included in more than one diagnosis group.
* indicates the statistical significance of the difference between the second quarter of 2019 and the second quarter of 2020 at the one-percent level.

Source: Authors' own calculations based on data from the National Association of Statutory Health Insurance Physicians (KBV).

Treatment cases declined by up to 20 percent during the first coronavirus lockdown.

Figure 2

Treatment cases according to age groups
Number per child



1 The estimated number is adjusted for the children's age, sex, and birth month as well as regional factors.

Note: A treatment case is the treatment of the same insured person by the same physician practice in the same calendar quarter at the expense of the same health insurance company (§21 para. 1 of the *Bundesmantelvertrag Ärzte*). One treatment case may include multiple physician visits.
* indicates the statistical significance of the difference between the second quarter of 2019 and the second quarter of 2020 at the one-percent level.

Source: Authors' own calculations based on data from the National Association of Statutory Health Insurance Physicians (KBV).

Treatment cases declined by up to 20 percent during the first coronavirus lockdown.

it is possible to adjust the results for differences between counties in how they handled the lockdown.[18]

Selected diagnosis groups and total treatment cases are analyzed

The dataset at hand contains in principle all diagnoses issued by outpatient physicians and billed to the statutory health insurance companies. For the analyses in this report, key *physical diseases* that occur very frequently and were presumably affected by the measures in the first lockdown were selected, such as respiratory infections. Other common childhood diseases were investigated as well: infections, diseases of the ear and mastoid process, and diseases of the respiratory system. Within these groups of diagnoses, diagnoses of particular interest are evaluated separately (Box). Additionally, the diagnosis group *injuries* was analyzed, as it is expected that the number of injuries would decline due to fewer playground visits and the suspension of recreational sports.[19]

In addition to physical diseases, mental and behavioral disorders are examined, which can have serious consequences for a child's development, especially in the long term. The *chronic diseases* diagnosis group, including diabetes, celiac disease,

18 Considering the county in which a child lives is important in order to control for other regional differences relevant to health, such as regional environmental pollution.

19 These are only injuries that occurred in a private environment, such as at the home, since injuries that occur at day care centers and schools are not billed via KBV, but via accident insurance companies.

and allergic rhinitis,[20] was analyzed as well and should be unaffected by lockdown-related measures. Furthermore, the number of all treatment cases in the respective quarters is recorded as an indicator for the number of average physician visits per child.[21] In doing so, it can be ruled out that the selected diagnosis groups are providing a biased picture and that other diseases that may have led to more physician visits were accidentally left out. If this was the case, they would at least be reflected in the total number of treatment cases.

Substantial changes in physical diseases

The changes in the selected diagnoses and treatment cases in the second quarter of 2020 compared to the second quarter of 2019 are examined separately for the different age groups.

Toddlers: markedly fewer infections

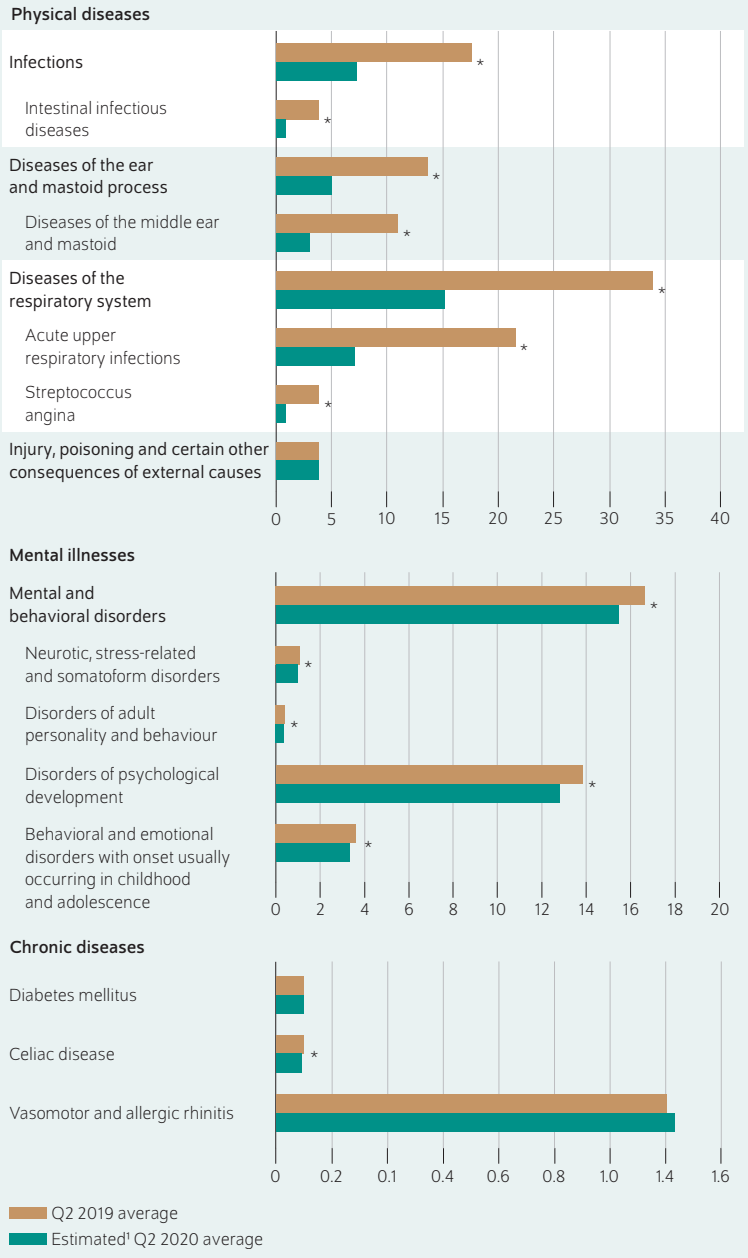
Almost 24 percent of one- to two-year-olds who are statutorily insured and visited a physician at least once between January 2019 and June 2020 were diagnosed with an infection in the second quarter of 2019 (Figure 1, upper section). At ten percent, diseases of the ear were less frequent in the second quarter of 2019, while respiratory diseases were relatively common with an incidence of nearly 39 percent. Injuries were diagnosed significantly less frequently with only four percent. In the second quarter of 2020, during and shortly after the first coronavirus lockdown, the share of children that was diagnosed with a contagious physical disease was at least 50 percent lower compared to 2019. The largest decrease, 78 percent, can be noted for diseases of the middle ear and mastoid. In contrast, the seven-percent decrease in injuries is rather small.

Diagnoses of mental and behavioral disorders (Figure 1, middle section) are very rare in toddlers, occurring in just under seven percent of the one- to two-year-old children in the data analyzed. Again, diagnoses are tend to decrease from 2019 to 2020, but the reductions are very small (three percent overall).

Chronic diseases are of no great significance in this group; less than two percent of toddlers were diagnosed with a chronic disease (Figure 1, bottom section). Moreover, as expected, there was no significant change in individual diagnoses between the second quarter of 2019 and the second quarter of 2020. The number of treatment cases for toddlers declined from 0.9 to 0.8 cases per child (Figure 2).

Figure 3

Sick three- to five-year-old children classified by selected diagnosis groups
Shares in percent



1 The estimated average is adjusted for the children's age, sex, and birth month as well as regional factors.

Legend: Almost 18 percent of three- to five-year-olds who are statutorily (publicly) insured and had at least one physician visit between January 2019 and June 2020 were diagnosed with an infection in the second quarter of 2019. A year later in the second quarter of 2020, the share was about half as large.

Note: It is possible for a child to be included in more than one diagnosis group.
* indicates the statistical significance of the difference between the second quarter of 2019 and the second quarter of 2020 at the one-percent level.

Source: Authors' own calculations based on data from the National Association of Statutory Health Insurance Physicians (KBV).

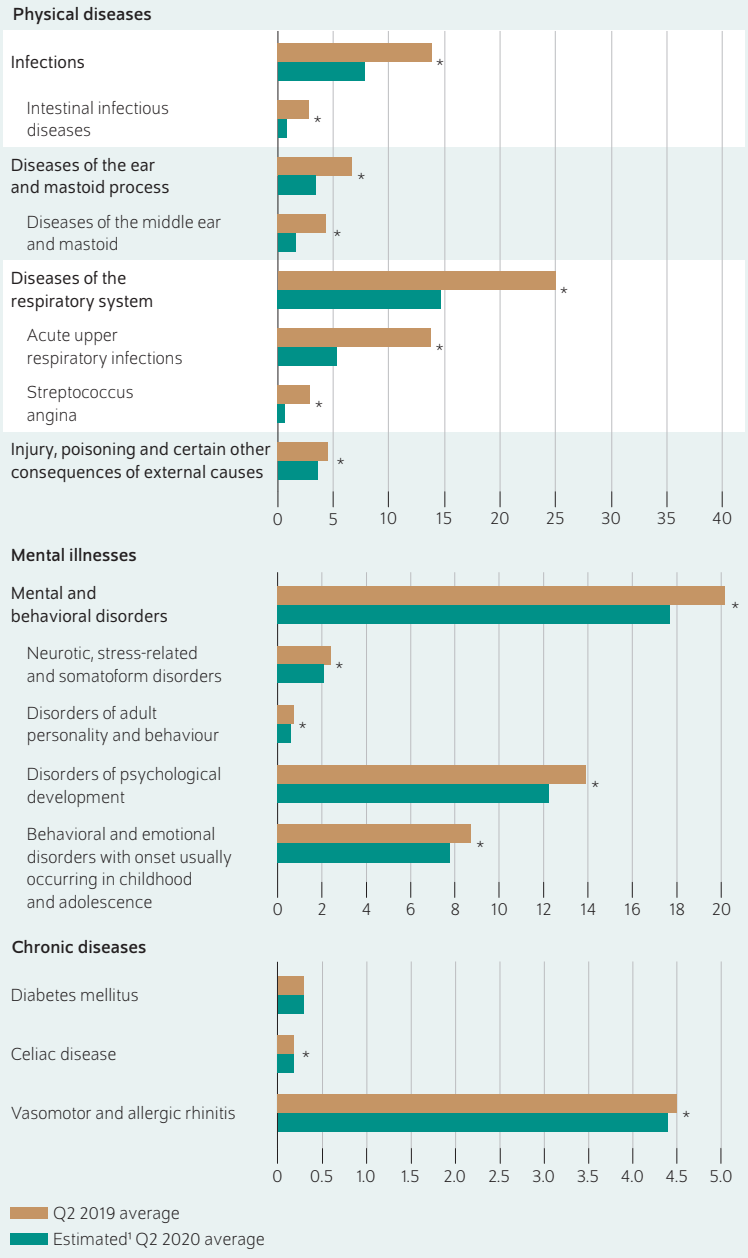
Diagnoses of physical diseases also declined notably for preschool-aged children.

20 The diagnoses were selected following a discussion with colleagues in the medical field. However, the responsibility of the final selection lies exclusively with the authors of this report.

21 A treatment case is the treatment of the same insured person by the same physician practice in the same calendar quarter at the expense of the same health insurance company (§ 21 para. 1 of the *Bundesmantelvertrag Ärzte*). It is possible that one treatment case includes multiple physician visits.

Figure 4

Sick six- to ten-year-old children classified by selected diagnosis groups
Shares in percent



1 The estimated average is adjusted for the children's age, sex, and birth month as well as regional factors.

Legend: Almost 14 percent of six- to ten-year-olds who are statutorily (publicly) insured and had at least one physician visit between January 2019 and June 2020 were diagnosed with an infection in the second quarter of 2019. A year later in the second quarter of 2020, the share was about half as large.

Note: It is possible for a child to be included in more than one diagnosis group.
* indicates the statistical significance of the difference between the second quarter of 2019 and the second quarter of 2020 at the one-percent level.

Source: Authors' own calculations based on data from the National Association of Statutory Health Insurance Physicians (KBV).

Diagnoses of injuries declined by about one-fifth in school-aged children in spring 2020.

Preschool-aged children: similar declines in physical diseases

The incidence of the various diagnoses of physical contagious diseases and of injuries for three- to five-year-old children—who were generally able to attend day care centers to a limited extent at most in the second quarter of 2020—does not differ greatly from the incidences in the younger age group. Here, too, the incidence decreased for almost all diagnoses by more than 50 percent in the second quarter of 2020 (Figure 3, upper section). The largest decline (77 percent) concerns intestinal infectious diseases and streptococcus angina. In absolute terms, however, this corresponds in both cases to a small decline from just under four percent to one percent of the children. The decline in injuries is not statistically significant.

For mental health-related diagnoses, which were more than twice as common in this age group in 2019 as they were for toddlers (Figure 3, middle section), the decline is very modest. Overall, diagnoses of mental and behavioral disorders declined by seven percent. Chronic illness diagnoses barely changed between the second quarter of 2019 and the second quarter of 2020 (Figure 3, bottom section). The number of treatment cases declined by 20 percent (Figure 2).

Elementary-school children: Injuries decreased by one-fifth

Generally, school-aged children are diagnosed with fewer infectious diseases than younger children (Figure 4, upper section). Also for this age group diagnoses in the second quarter of 2020 decreased, but in relative terms not as much as for the younger age groups. Only the diagnosis of streptococcus angina depicted a similarly large decrease, while the decrease in infections from 14 to eight percent of affected children was "only" 44 percent. It is remarkable, however, that the frequency of injuries declined by 20 percent.

Mental illness diagnoses are more frequent in school-aged children compared to younger children. A decline in mental and behavioral disorders between the two quarters was detected (Figure 4, middle section). Compared with the two other age groups, the declines (around 12 percent) are somewhat larger. The share of children diagnosed with diabetes (a chronic illness) also did not change substantially in this age group (Figure 4, bottom section).

Pre-teens: treatment cases declined somewhat less compared to younger children

The results for the 11- to 12-year-olds are similar to those for the school-aged children. There is a decline of 33 percent in injuries, which is small in absolute terms and only makes up two percentage points (Figure 5, upper section). In terms of mental health, there are also larger declines in diagnoses of mental and behavioral disorders compared to younger school-aged children (Figure 5, middle section), although these are smaller compared to the declines in

Box

Data and methodology

Data

The analyses are based on administrative health insurance data of all statutory health insurance companies in Germany that are collected by the National Association of Statutory Health Insurance Physicians (*Kassenärztliche Bundesvereinigung*, KBV). The data encompass around 90 percent of the population (all statutorily insured people in Germany). The dataset has existed since 2009 and includes all confirmed diagnoses (as ICD-10 codes[1]) at the patient level made by outpatient physicians, billed charges, the number of treatment cases, and the patients' birth year, birth month, sex, and the county in which they live.

In this study, data from the second quarter of 2019 and the second quarter of 2020 are compared. The birth cohorts observed are 2007 to 2019. Physical, mental, and chronic illnesses are considered in the analysis. Additionally, the number of treatment cases are included. From over 13,000 diagnosis codes[2] that exist, selected groups and sub-groups were analyzed.[3] The *physical diseases* analysis is based on the following "chapters:" certain infectious and parasitic diseases (A00-B99), diseases of the ear and mastoid process (H60-H95), and diseases of the respiratory system (J00-J99). Within these chapters, individual, particularly common or serious subgroups are considered: intestinal infectious diseases (A00-A09), diseases of middle ear and mastoid (H65-H75), acute upper respiratory infections (J00-J06), and streptococcus angina (J03, B95). The injury, poisoning and certain other consequences of external causes (S00-T98) chapter is also analyzed.

To capture changes in mental illnesses, the chapter on mental and behavioral disorders (F00-F99) is used. Within this chapter, the following subgroups are considered: neurotic, stress-related and somatoform disorders (F40-F48); disorders of adult personality and behavior (F60-F69); disorders of psychological development (F80-F89); and behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90-F98). As a part of the analysis of *chronic diseases* the following diseases are analyzed: diabetes mellitus (E10-E14), celiac disease (K90), and vasomotor and allergic rhinitis (J30). All outcome variables are binary coded, which means they are 1 if a child had a relevant diagnosis at least once per quarter and they are 0 if there was no relevant diagnosis in that quarter.

Methodology

In the analyses, it is investigated how the incidence of the various diagnoses changed in the second quarter of 2020 compared to the second quarter of 2019. For this, a linear regression model is estimated. In this model, important influencing factors such as the sex and the birth month of the children are considered. Additionally, it is controlled for location-specific characteristics (at the county level). The standard errors are clustered at the county level. Using the regression analysis, the percentage difference of the prevalence of the illnesses compared to the second quarter of the previous year is estimated. Thus, it can be ruled out that the changes in diagnoses are due to changes in the patient population in terms of sex and age composition.

1 The International Classification of Diseases, 10th edition, German Modification is the official classification for coding diagnoses in outpatient and inpatient care in Germany. Cf. Bundesinstitut für Arzneimittel und Medizinprodukt, *ICD-10-GM* (in German; available online).

2 Cf. Bundesinstitut für Arzneimittel und Medizinprodukte, *Klassifikationen – FAQ* (in German; available online).

3 Cf. ICD Code (in German; available online).

physical diseases. There are no observable large changes in diabetes and celiac disease diagnoses between the second quarters of 2019 and 2020 (Figure 5, bottom section). The number of treatment cases decreased by 16 percent (from 0.7 to 0.6 per child), somewhat less than the decline for the younger school-aged children (Figure 2).

Reasons for declines in diagnoses can be manifold

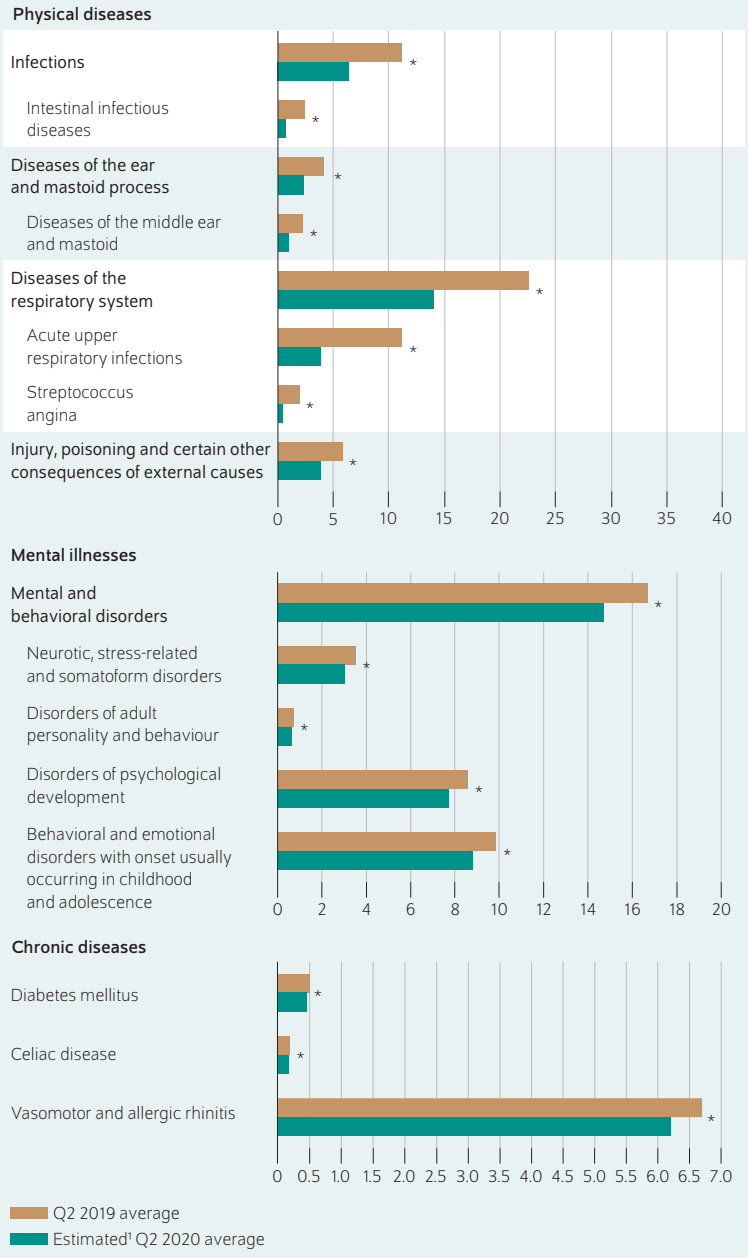
Across all age groups, there are declines in diagnosed diseases in children up to 12 years old between the second quarters of 2019 and 2020. The declines in diagnosed physical contagious diseases are particularly large, especially for younger children. The available data do not allow us to identify the underlying causes for the declines. However, different reasons can be hypothesized. On the one hand, it seems likely that some parents did not take their child to physician offices to avoid the risk of infection. This could be one reason for the decline, especially at the beginning of the pandemic when little was known about the risk of infection with coronavirus in children. However, the findings suggest this was only the case when there was no severe disease progression, such as chronic illness.

On the other hand, the lockdown-related contact restrictions and closed day care centers, schools, and playgrounds could have led to a reduced number of children getting infected with colds or intestinal viruses compared to pre-pandemic levels and thus children were actually less sick.[22] However, the closure of day care centers and schools could have negative consequences in the medium or long term, especially when considering the renewed closures during the second lockdown. Such consequences could be reflected in the socio-emotional behavior of children. Future research must show in how far and to what extent this is the case.

22 The RKI has already announced a decline in infections that must be reported for adults. For more details, see the first footnote in this report.

Figure 5

Sick 11- and 12-year-old children classified by selected diagnosis groups
Shares in percent



1 The estimated average is adjusted for the children's age, sex, and birth month as well as regional factors.

Legend: A little over 11 percent of 11- and 12-year-olds who are statutorily (publicly) insured and had at least one physician visit between January 2019 and June 2020 were diagnosed with an infection in the second quarter of 2019. A year later in the second quarter of 2020, the share was noticeably lower.

Note: It is possible for a child to be included in more than one diagnosis group.
* indicates the statistical significance of the difference between the second quarter of 2019 and the second quarter of 2020 at the one-percent level.

Source: Authors' own calculations based on data from the National Association of Statutory Health Insurance Physicians (KBV).

The declines in chronic illnesses were notably smaller than the declines in other diagnosis groups.

In the short term, the lockdown did not lead to any major, significant changes in the diagnoses of mental or behavioral disorders in children under six years. There was no increase in mental or behavioral disorder diagnoses, but there was no decrease for younger children either. If it is also taken into account that some parents forewent physician visits due to the risk of infection, the insignificant effect is remarkable. As the COPSY study[23] and other studies suggest, clinically measurable mental illnesses could also increase in the medium to long term.

Other surveys have shown that families are experiencing great stress during the pandemic. Family life satisfaction, particularly of mothers with very young children, declined shortly after the beginning of the first lockdown. Satisfaction with child care has also decreased substantially. The decline in maternal satisfaction could also impact children's health in the medium term.[24]

For elementary-school-children and the somewhat older preteens, it can be stated that the decline in physical disease diagnoses during the first coronavirus lockdown was not as large as the decline for younger children. To what extent this can be linked to the fact that children in this age group no longer contract viruses as quickly and frequently or that parents were less concerned that their children would contract the coronavirus at the physician's office[25] cannot be determined using this data. Notable is the decrease in injuries: One reason for this could be the suspension of recreational sports and the resulting reduced movement on average.

For children in all age groups, there were no observable large declines in chronic illnesses, especially for diabetes and celiac disease. These are illnesses that are not influenced by contact restrictions. The results emphasize that parents of chronically ill children did not forego physician visits despite the coronavirus pandemic. Therefore, more severe courses of chronic diseases or catch-up effects are not expected. Medical care in this area, according to the results of this report, did not suffer.

Conclusion: continue monitoring children's health over the course of and beyond the pandemic

Good health is a key aspect for child development. As DIW Berlin's *FamilienMonitor_Corona*[26] shows, many parents were greatly concerned about their children's health and education during the second lockdown: In January 2021, around 90 percent of parents were concerned about their children's education and around 90 percent were greatly or somewhat

23 Cf. UKE Hamburg, *COPSY-Studie*.

24 Cf. Mathias Huebener et al., "Wohlbefinden von Familien in Zeiten von Corona: Eltern mit jungen Kindern am stärksten beeinträchtigt," *DIW Wochenbericht* no. 30/31 (2020): 527-537 (in German; available online).

25 This can be related to the fact that a child's immune system strengthens with age.

26 Cf. DIW Berlin's FamilienMonitor_Corona (in German; available online).

concerned about their children's health.[27] Considering the second lockdown, persistently high infection rates, and the results of studies such as the COPSY study, it can therefore not be ruled out that clinically measurable mental illnesses will tend to increase in the medium term, especially among children and adolescents. Special attention is needed if long-term consequences of such early psychological issues are to be reduced.[28] Moreover, it is possible that physical health problems will increase as a result of children moving less and partly consuming more unhealthy food, which is associated with obesity and other health issues.[29]

The finding that the share of children with diagnosed infections, respiratory diseases, and ear diseases substantially decreased during the first lockdown in spring 2020 can likely be at least partly attributed to day care and school closures and, accordingly, could continue throughout the rest of the pandemic. This can be an indication that more attention should be paid to children's health and their risk of infection when reopening day care centers and schools. While the Act on good quality for day care centers (*Gute-KiTa-Gesetz*)[30] has identified child health as one independent field of action for good quality, none of the federal states selected it as an area to be addressed with additional federal funding. Smaller day care groups and larger outdoor spaces are two examples of approaches that could contribute to lowering the risks of infection in these centers. Moreover, following other countries' example, health care professionals could also work in day care centers to diagnose illnesses at an early stage and assist children in cases of non-severe illnesses, which would relieve the parents simultaneously.[31]

Children's health should be an important priority after the pandemic in elementary schools as well. With respect to this, there has already been much discussion about the risk of infection in the classroom and solutions such as adequate hygiene concepts, air filters, masks, rapid tests, and vaccinations were suggested. Only healthy children are able to develop their cognitive and non-cognitive skills effectively and efficiently.[32] An aging society such as Germany's should promote human capital as its greatest priority and thus invest greatly in preventative health care for children.

27 Cf. Mathias Huebener et al.,"Kein 'Entweder- oder': Eltern sorgen sich im Lockdown um Bildung und Gesundheit ihrer Kinder," *DIW aktuell* 59 (2021) (in German; available online).

28 Cf. for example the suggestions of the Academic Advisory Council on Family Matters in its most recent statement: C. Katharina Spiess, Margarete Schuler-Harms, Jörg M. Fegert, and the Wissenschaftliche Beirat für Familienfragen, *Erholung und gezielte Unterstützung für Familien: Ein nachhaltiges Investitionsprogramm muss differenzieren* (2020) (in German; forthcoming online).

29 A Japanese study proved, for example, that significant weight gain among obese children is a consequence of the COVID-19 pandemic, cf. Reo Takaku and Izumi Yokoyama, "What the COVID-19 school closure left in its wake: Evidence from a regression discontinuity analysis in Japan," *Journal of Public Economics* 195 (2021): 104364.

30 Cf. Federal Ministry for Family Affairs, Senior Citizens, Women and Youth, *Das Gute-KiTa-Gesetz* (in German; available online).

31 Such a concept, however, presupposes an expansion of day care services, which would be developed into centers for families and provide families support in many ways, cf. for example Sophia Schmitz and C. Katharina Spiess, *Familien im Zentrum – Unterschiedliche Perspektiven auf neue Ansatzpunkte der Kinder-, Eltern- und Familienförderung* (2019) (in German; available online).

32 Here, too, it would be worth considering whether, as in Norway and Sweden, medically trained professionals should monitor children's health. Studies show that this actually has a positive long-term impact on the health of the children and other outcome measures, cf. for example Rita Ginja (with Signe A. Abrahamsen and Julie Rüse), "School Health Programs: Education, Health, and Welfare Dependency of Young Adults." Speech at the Berlin Applied Micro Seminar on March 22, 2021; Gerard J. van den Berg and Bettina M. Siflinger, "The effects of day care on health during childhood: evidence by age," *IZA Discussion Paper* 11, no. 447 (2020).

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