

Pediatric ICU Admissions After Adolescent Suicide Attempts During the Pandemic

Nora Bruns, MD,^a Lea Willemsen,^a Andreas Stang, MD, MPH,^b Bernd Kowall, PhD,^b Katharina Holtkamp,^a Oliver Kamp, MD,^c Marcel Dudda, MD,^c Florian Hey, MD,^d Florian Hoffmann, MD,^d Judith Blankenburg, MD,^e Frank Eifinger, MD,^f Hans Fuchs, MD,^g Roland Haase, MD,^h Jan Baier, MD,^h Clemens Andrée, MD,ⁱ Michael Heldmann, MD,^j Vanessa Maldera, MD,^j Jenny Potratz, MD,^k Daniel Kurz, MD,^l Nadine Mand, MD,^m Claus Doerfel, MD,ⁿ Tobias Rothoefel, MD,^o Michel Schultz, MD,^o Manuel Ohlert, MD,^p Katrin Silkenbäumer, MD,^q Thomas Boesing, MD,^q Fithri Indraswari MD,^r Frank Niemann, MD,^s Peter Jahn, MD,^t Michael Merker, MD,^u Nicole Braun, MD,^v Francisco Brevis Nunez, MD,^w Matthias Engler, MD,^x Konrad Heimann, MD,^y Milian Brasche, MD,^y Gerhard Wolf, MD,^z Holger Freymann, MD,^{aa} Martin Dercks, MD,^{bb} Marc Hoppenz, MD,^{cc} Ursula Felderhoff-Müser, MD,^a Christian Dohna-Schwake, MD^a

abstract

BACKGROUND AND OBJECTIVES: The worldwide severe acute respiratory syndrome coronavirus 2 pandemic challenges adolescents' mental health. In this study, we aim to compare the number of pediatric ICU (PICU) admissions after suicide attempts during the first German lockdown and one year later during a second, prolonged lockdown with prepandemic years.

METHODS: A retrospective multicenter study was conducted among 27 German PICUs. Cases <18 years admitted to the PICU because of accidents or injuries between March 16 and May 31 of 2017 to 2021 were identified based on International Classification of Diseases, 10th Revision codes (German modification) and patient data entered into a database. This study is a subset analysis on suicide attempts in adolescents aged 12 to 17.9 years. The Federal Statistics Office was queried for data on fatal suicides, which were available only for 2020 in adolescents aged 10 to 17.9 years.

RESULTS: Total admissions and suicide attempts declined during the first lockdown in 2020 (standardized morbidity ratio 0.74 [95% confidence interval; 0.58–0.92] and 0.69 [0.43–1.04], respectively) and increased in 2021 (standardized morbidity ratio 2.14 [1.86–2.45] and 2.84 [2.29–3.49], respectively). Fatal suicide rates remained stable between 2017 to 2019 and 2020 (1.57 vs 1.48 per 100 000 adolescent years) with monthly numbers showing no clear trend during the course of 2020.

CONCLUSIONS: This study shows a strong increase in serious suicide attempts among adolescents during the course of the pandemic in Germany. More research is needed to understand the relation between pandemic prevention measures and suicidal ideation to help implement mental health support for adolescents.



^aDepartment of Pediatrics I, Pediatric Intensive Care Medicine, ^bInstitute of Medical Informatics, Biometry and Epidemiology, ^cDepartment of Trauma, Hand and Reconstructive Surgery, University Medicine Essen, University of Duisburg-Essen, Essen, Germany; ^dPediatric Clinic and Pediatric Polyclinic at the Dr. von Haunerschen Children's Hospital, Interdisciplinary pediatric ICU - Pediatric Emergency Medicine, LMU Munich, Munich, Germany; ^eDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Dresden, Dresden, Germany; ^fDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Cologne, University of Cologne, Cologne, Germany; ^gDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Freiburg, University of Freiburg, Freiburg, Germany; ^hDepartment of Pediatrics, Neonatology and Pediatric Intensive Care Medicine, University Hospital Halle, University of Halle, Halle, Germany; ⁱDepartment of Pediatrics, Pediatric Intensive Care Medicine, Helios Hospital Krefeld, Krefeld, Germany; ^jDepartment of Pediatrics, Pediatric Intensive Care Medicine, Helios University Hospital Wuppertal, Wuppertal, Germany; ^kDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital, Münster, Münster, Germany; ^lDepartment of Pediatrics 3, Pediatric Cardiology, Pediatric Intensive Care Medicine, Olgahospital Stuttgart, Stuttgart, Germany; ^mDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Marburg, Philipps University of

WHAT'S KNOWN ON THIS SUBJECT: Adolescents are at low risk for severe illness directly caused by severe acute respiratory syndrome coronavirus 2, but restrictions to control the spread of pandemic seriously affect their mental health.

WHAT THIS STUDY ADDS: Serious suicide attempts requiring intensive care treatment strongly increased in adolescents during the course of the pandemic in Germany.

To cite: Bruns N, Willemsen L, Stang A, et al. Pediatric ICU Admissions After Adolescent Suicide Attempts During the Pandemic. *Pediatrics*. 2022;150(2):e2021055973

During the worldwide coronavirus disease 2019 (COVID-19) pandemic, children and adolescents have been at a very low risk for severe disease from severe acute respiratory syndrome coronavirus 2 infections. However, restrictions minimizing social contacts to stop the virus spread challenge mental well-being of this vulnerable group. Limited social contacts, loneliness, and uncertainty about the future are among COVID-19-related stressors that potentially affect mental well-being especially in adolescents. Public concerns have been raised about an increase of self-harm, suicidal ideation, and suicides among adolescents.

Surprisingly, several studies reported a decrease of psychiatric emergencies, suicidal behaviors, and suicidality in children and adolescents during the initial lockdowns,¹⁻⁴ whereas some found no or only slight changes compared to the prepandemic era.⁵⁻⁸ Yet, 23% of children and adolescents who presented with a psychiatric emergency during the initial phase of the pandemic had a moderate or severe COVID-19-related stressor directly related to the clinical presentation.¹ In New York, emergency department visits for suicidal ideation, suicide attempts, and self-harm doubled during the first pandemic wave,⁹ potentially driven by the extreme emergency situation during the first wave there. Self-reported unbearable stress peaked at the height of the first pandemic wave compared to baseline and follow-up, with the disruption of normal routine being the most common stressor.¹⁰

As the pandemic continues, children and adolescents are likely to have increasingly suffered from the ongoing disruption of normal life. During the second pandemic wave in Germany, which led to the reimplementation of lockdown

measures in November 2020, pediatric intensive caregivers observed increased pediatric ICU (PICU) admissions of adolescents after suicide attempts or self-harm with suicidal intention. To quantify the presumed changes, we conducted a follow-up of a retrospective multicenter study on PICU admissions after accidents and injuries to German PICUs during the first COVID-19 lockdown.

METHODS

Study Design and Recruitment

The data presented here are a subset analysis of a larger retrospective observational multicenter study.¹¹ Members of the German Society of Neonatal and Pediatric Intensive Care and heads of pediatric intensive care departments identified via the homepage of German Society for Pediatrics were inquired via E-mail to participate in the initial study. Inquiries for participation in the initial study were sent out twice between September of 2020 and February of 2021. The 37 centers participating in the initial study were asked to participate in the follow-up in June 2021.

Eligibility and Identification of Cases

Patients <18 years of age admitted to a German pediatric ICU because of accidents or injuries were eligible. Because no standardized hospital or PICU admission criteria exist in Germany, the decision for PICU admission was at the discretion of the attending physician or hospital. The observation period of the first wave was the first German lockdown (March 16 to May 31, 2020). The corresponding calendar periods of the years 2017 to 2019 served as reference period. For the second wave, the study was extended by the same period of 2021. For this study, we analyzed data

on admissions for suicides of patients aged 12 to 17.9 years.

The diagnoses defining eligibility were S00–S99 and T00–T78 according to the German modification of the International Classification of Diseases, 10 Revision. S codes apply for trauma diagnoses and T codes apply for other injury types or damage from external sources. A case was considered a suicide attempt if any of the discharge diagnoses was “suicide attempt,” “acute suicidality,” or self-harm with “suicidal intention.”

Eligible patients were identified via the local hospitals’ medical controlling services.

German Lockdowns

2020: The first German lockdown came into effect on March 16, 2020

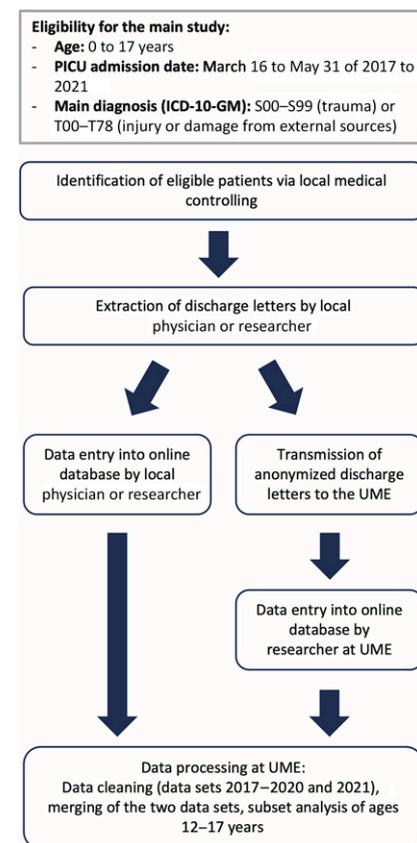


FIGURE 1 Identification of cases and data flow. ICD-10-GM, International Classification of Diseases, 10th Revision, German modification. UME, University Medicine Essen.



FIGURE 2
Distribution of the participating centers within Germany. Red dot indicates principal study site (University Medicine Essen). Image based on “Karte Deutsche Bundesländer (nummeriert).svg” by David Liuzzo (license: CC BY-SA 2.0 de, <https://commons.wikimedia.org/w/index.php?curid=2594472>).

with school and day care closures. Recreational facilities including playgrounds were closed and people urged to reduce their contacts and stay at home. Group gatherings were prohibited. Performing individual sports outside or leaving the house was not prohibited or restricted to a specific distance from home or

amount of time. Compared to other European countries like France, Italy, Spain, and the United Kingdom, the German lockdown was less strict and relied on voluntary participation of the population. Unlike in other countries, restructuring of the health care system was not applied to pediatric departments and pediatric intensive care units, which remained fully functional during the lockdown. From the beginning of May, the lockdown measures were gradually relaxed until May 31, 2020.

2021: The second German lockdown came into effect on November 2, 2020 and was designed as a “light” lockdown. It was repeatedly prolonged and gradually tightened until January 19, 2021. From then on, the restrictions were similar to those of the first lockdown described above with no predefined end. The lockdown ended at the end of May 2021.

Data Acquisition

Local investigators reviewed discharge summaries and entered anonymized clinical data online into a questionnaire hosted at Microsoft Office Forms 365 for institutional

users. Alternatively, anonymized discharge letters were transferred to the principal study site (Department of Pediatrics I, University Medicine Essen) and entered by LW and KH (Fig 1). After completing collection, the raw data sets (2017 to 2020 and 2021) were downloaded as Microsoft Office Excel files, imported into SAS Enterprise Guide 8.4, data cleaning performed, the data sets merged, and statistical analyses performed.

PICU Capacities

We accessed the DIVI (German Interdisciplinary Association of Intensive Care and Emergency Medicine) registry of intensive care beds and extracted the total numbers of PICUs and PICU beds in Germany and the number of PICU beds provided by the study centers.

Some children’s hospitals collapse pediatric and neonatal intensive care capacities in their reports to the DIVI registry. These centers were ignored for calculations, because we assumed that this information is missing completely at random between participating and nonparticipating centers.

TABLE 1 Clinical Characteristics of Adolescents Aged 12.0 to 17.9 Years Admitted to 27 German Pediatric Intensive Care Units Because of Accidents or Injuries Between March 16 and May 31 of the Years 2017 to 2021

	Overall <i>n</i> (%) ^a	Reference Period, 2017–2019, <i>n</i> _{total} / <i>n</i> _{average} (%) ^a	2020, <i>n</i> (%) ^a	2021, <i>n</i> (%) ^a
Admissions	588 (100)	300 of 100 (100)	74 (100)	214 (100)
Age, median (IQR)	15 (14–16)	15 (14–16)	15 (14–16)	15 (14–16)
Age, mean (95% CI)	14.8 (14.7–15.0)	14.8 (14.6–15.0)	14.9 (14.6–15.3)	14.8 (14.6–15.1)
Male	260 (44.2)	129 of 43 (43.0)	40 (54.0)	91 (42.5)
Female	325 (55.3)	169 of 56 (56.3)	34 (46.0)	122 (57.0)
Diverse	3 (0.5)	2 (0.7)	0 (0.0)	1 (0.5)
Length of PICU stay, d, median (IQR)	2 (1–2)	1 (1–2)	2 (1–2)	1 (1–2)
Mean (95% CI)	2.9 (2.3–3.5)	3.3 (2.2–4.3)	2.3 (1.7–2.8)	2.7 (1.9–3.5)
Mechanical ventilation	66 (11.2)	34 of 11 (11.3)	12 (16.2)	20 (9.4)
Duration of mechanical ventilation, d, median (IQR)	1 (1–4)	1 (1–4)	2 (1–4)	2 (1–3.5)
Mean (95% CI)	5.2 (2.1–8.2)	6.8 (1.1–12.5)	2.8 (1.3–4.2)	3.9 (0.7–7.1)
Vasopressors	32 (5.4)	13 of 4 (4.3)	6 (8.1)	13 (6.1)
Resuscitation	11 (1.9)	5 of 2 (1.7)	1 (1.4)	5 (2.3)
Died	6 (1.0)	0 (0.0)	2 (2.7)	4 (1.9)
Poor outcome of death or minimally conscious state	7 (1.2)	1 (0.3)	2 (2.7)	4 (1.9)

IQR, interquartile range.

^a Unless indicated otherwise

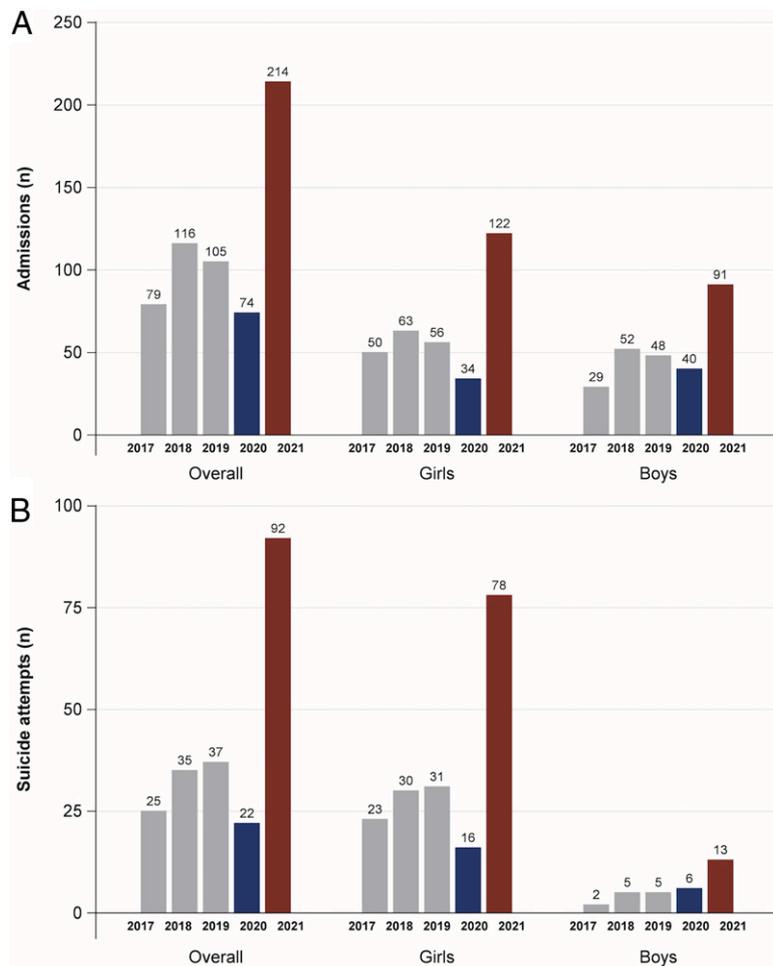


FIGURE 3

Numbers of admissions and suicides per period. Gray indicates reference period, blue indicates 2020, red indicates 2021. Patients with diverse sex are not shown (reference period: $n = 2$, 2020: $n = 0$, 2021: $n = 1$). A, Total of accidents or injuries. B, Suicide attempts.

Officially Registered Deaths From Suicide

To compare our data on nonfatal suicide attempts (SAs) with the number of fatal SAs, we retrieved data on officially registered deaths from suicides via a special inquiry to the Federal Statistical Office of Germany (https://www.destatis.de/EN/Home/_node.html). At the time of inquiry, data were available for each month of 2020 and included cases aged 10 to 17.9 years. For 2021, only preliminary monthly data on the entire population including all ages were available.

German Adolescent Population During the Studied Periods

No major migratory movements occurred during the study period within, into, or out of Germany. We extracted data of the end-of-year populations for each federal state and 1-year age group between 10.0 and 17.9 years of the years 2016 to 2021 from the homepage of the Federal Statistical Office of Germany (https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/_inhalt.html) to verify that the adolescent population was stable across Germany and within each

federal state. From these data we calculated nation-wide midyear populations for 2017 to 2021.

Statistical Analyses

Descriptive Statistics

For continuous variables we present the median with interquartile range and mean with 95% confidence interval (CI). For discrete variables, absolute and relative frequencies are given.

Standardized Morbidity Ratios

We estimated standardized morbidity ratios (SMR) for the observation periods based on age- and sex-stratified data. The years 2017 to 2019 served as reference period to calculate the expected number of cases for 2020 and 2021, respectively. The observed number of cases in 2020 and 2021, respectively, was divided by the expected number of cases. An SMR >1 indicates an increase and an SMR <1 a decrease of cases. For the calculation of 95% CIs, we employed the Poisson approximation in case of ≥ 15 events in the observation period and calculated exact CIs for <15 events.¹² Three patients with diverse sex, 2 from the reference period and 1 from 2021, were excluded from SMR calculations because of the low case number.

Incidence Rates

For fatal suicide attempts, we calculated yearly incidence rates and monthly incidence rate ratios (IRR) on the basis of the corresponding midyear populations. No sex-specific information on fatal SAs were available, allowing only the calculation of overall rates. CIs for incidence rates were calculated as described above for SMRs and for IRRs as described by Rothman et al.¹³

TABLE 2 Accident and Injury Types of Adolescents Aged 12.0 to 17.9 Years Admitted to 27 German Pediatric Intensive Care Units Because of Accidents or Injuries Between March 16 and May 31 of the Years 2017 to 2021

	Overall n (%)	Average During Reference Period (2017–2019) n (%)	2020 n (%)	2021 n (%)
Total	588 (100)	100 (100)	74 (100)	214 (100)
Type of accident or injury				
Ingestion ^a	30 (5.1)	4 (4.0)	5 (6.8)	13 (6.1)
Intoxication ^b	286 (48.6)	46 (46.3)	28 (37.8)	119 (55.6)
Drowning or suffocation	4 (0.7)	0 (0.0)	1 (1.4)	3 (1.4)
Trauma	237 (40.3)	42 (42.3)	39 (52.7)	71 (33.2)
Other type of injury ^c	29 (4.9)	7 (6.7)	1 (1.4)	8 (3.7)
Unknown accident or injury	2 (0.3)	1 (0.7)	0 (0.0)	0 (0.0)
Nonaccidental injury				
Confirmed	245 (41.7)	38 (38.3)	20 (27.0)	110 (51.4)
Confirmed and suspected	271 (46.1)	43 (42.7)	25 (33.8)	118 (55.1)
Confirmed nonaccidental non-suicidal	70 (11.9)	11 (11.3)	5 (6.8)	31 (14.5)
Suicide attempt				
Confirmed	211 (35.9)	32 (32.3)	22 (29.7)	92 (43.0)
Confirmed and suspected	226 (38.4)	35 (35.0)	26 (35.1)	95 (44.4)

^a Refers to objects.

^b Refers to poisoning or overdose.

^c Aspiration, burn, scalding, drowning, suffocation, inhalation of toxic gas, or electrical injury.

Software

SAS Enterprise Guide 8.4 (SAS Institute Inc, Cary, NC, USA) was used to perform statistical analyses and produce figures. SISA software¹⁴ was used to calculate exact and Poisson CIs for SMRs. Microsoft Office PowerPoint 2019 (Microsoft Corporation, Redmond, WA, USA) was used to create a map of Germany based on “Karte Deutsche Bundesländer (nummeriert).svg” by David Liuzzo (license: CC BY-SA 2.0 de, <https://commons.wikimedia.org/w/index.php?curid=2594472>).

Ethics Approval

The original study and its follow-up were approved by the ethics committee of the Medical Faculty of the University of Duisburg-Essen (20-9560-BO and 20-9560_1-BO). Local ethics committees of the participating centers additionally approved the study if required by local regulations. Patient informed consent for retrospective anonymized data were not required according to national legislation. Data entry and storage in Microsoft Office Forms 365 is in line with the General Data Protection Regulation of the European Union (Regulation [EU] 2016/679).

RESULTS

In the first wave, 37 (23%) of 159 German PICUs participated. Twenty-seven (73%) of the initial PICUs participated in the second wave, comprising 17% of German PICUs and 147 (18.4%) of 801 registered German PICU beds (Fig 2). Thirteen (48%) of the participating PICUs were located in University Hospitals. According to the DIVI registry, the proportion of University Hospitals among German PICUs across Germany is 33 of 159 (21%).

A total of 588 adolescents between 12.0 and 17.9 years was admitted across all studied periods (Table 1). Total admissions because of accidents or injuries declined from an average number of 100 per period in 2017 to 2019 to 74 in 2020 and increased to 214 in 2021 (Fig 3A). Alike, admissions after nonaccidental injuries declined in 2020 (SMR 0.52 [95% CI 0.32–0.81]) and then rose in 2021 (2.87 [2.36–3.46]), applying both for SAs (Table 2, Fig 3B) and nonaccidental non-suicidal injuries (SMR 2020: 0.44 [0.14–1.03]; 2021: 2.73 [1.86 – 3.89]) (Table 2). Sex-specific differences were

present during the first lockdown with a decline in SAs among girls but not among boys (Fig 4).

No fatal SAs were reported in the reference period but in 2020 ($n = 2$) and 2021 ($n = 4$). According to national suicide statistics, there was no increase in fatal SAs in 2020 compared to the reference period in adolescents aged 10 to 17.9 years (Table 3, Fig 5, Supplemental Fig 6, Supplemental Table 4).

DISCUSSION

This longitudinal multisite study across Germany found a dramatic increase in PICU admissions after suicide attempts in adolescents during the second lockdown in 2021, after an initial decrease during the first lockdown in 2020. Likewise, total PICU admissions related to trauma or injuries also increased in the 2021 lockdown after a decline in the 2020 lockdown. Suicide statistics provided no evidence that fatal SAs among adolescents increased compared to prepandemic years or during the course of 2020.

Studies on long-term effects of COVID-19 restrictions showed

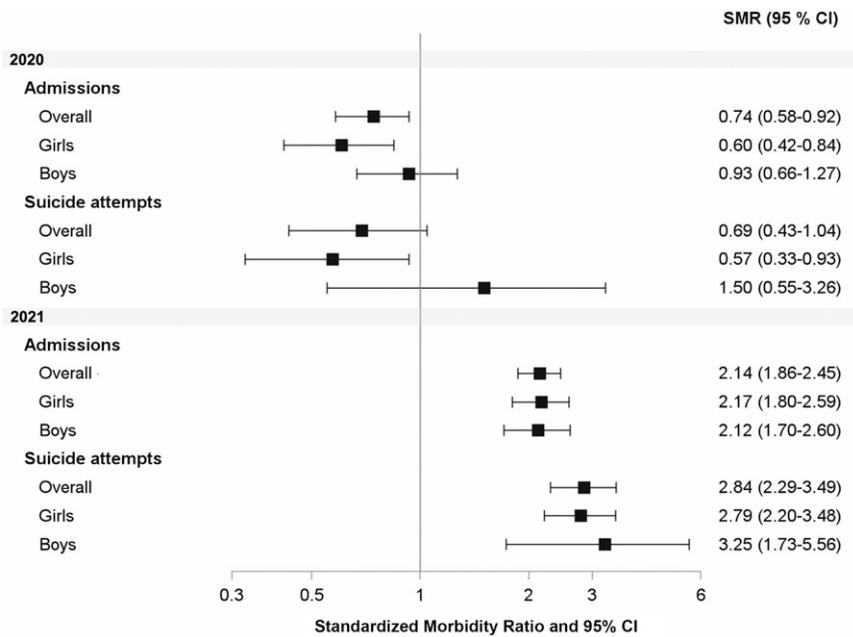


FIGURE 4

Standardized morbidity ratios in 2020 and 2021. The reference period was 2017 to 2019 for all calculations. Patients with diverse sex were excluded because small case numbers did not permit the calculation of SMRs.

increasing mental health problems among children and adolescents during the course of the pandemic. Heads of child and adolescent psychiatric departments in Europe perceived the impact of the pandemic on mental health and psychopathology of children and adolescents as “medium” in 2020, with an increase to “strong” or “extreme” in 2021.¹⁵ More than 80% reported an increase in suicidal crises.¹⁵ During a 6 month-lockdown in Australia, mental health-associated presentations increased by 47% and presentations because of suicidality by 59% in the last months of the lockdown.¹⁶ In France, the number of suicide attempts was lowest during the first lockdown (March and April 2020) and highest at the beginning of

the second lockdown (November and December 2020) with a 299% increase.¹⁷ Among adolescents in the United States aged 12 to 17 years, the mean weekly number of emergency department visits for suspected suicide attempts were 26.2% higher during summer 2020 and 50.6% higher at the beginning of 2021 than during the corresponding periods in 2019.¹⁸

Besides such critical peaks that were typically related to regional peaks of pandemic waves or excessively long lockdowns, a population-based registry on suicide attempts from Catalonia showed a 195% increase in girls’ suicide attempts between September 2020 and March 2021 compared to the 6 months before.¹⁹

TABLE 3 Fatal Suicide Attempts Among Adolescents Aged 10.0 to 17.9 Years in Germany From 2017 to 2020

	Overall	Average 2017–2019	2017	2018	2019	2020
<i>n</i>	372	94	107	90	85	90
Incidence rate per 100 000 adolescent years	1.54	1.57	1.79	1.50	1.41	1.48

No data on 2021 available at the time of inquiry.

An increase during the September to March period was also observed in the prepandemic year, but only by 54%.¹⁹ Our results do not allow the conclusion that the second observation period represents a critical peak related to the lockdown rather than a longer-term trend. However, they generally align with the above findings on SAs not admitted to intensive care and provide new evidence that also serious suicide attempts requiring intensive care treatment increased. The degree of increase for the severe cases captured by this study was similar to non-PICU cases with an SMR of 2.84 in our study versus 200 to 300% increases. This multisite cross-national study shows that adolescent suicidality has evolved as an increasingly serious public health problem that affects various pediatrics subspecialties and requires interdisciplinary treatment efforts in the acute and subacute phases.

An increase in suicidality during the pandemic may result from the interaction of preexisting risk factors such as depression, anxiety, substance abuse, other psychiatric disorders, previous psychological trauma, personality traits, and other stressors.²⁰ Yet, there is clear evidence from around the world that the pandemic exerts stress on adolescents. A minority of children and adolescents whose mental well-being improved during the pandemic provides important insight for potential interventions.²¹ These children and adolescents reported improved relationships, reduced loneliness and exclusion, reduced bullying, better management of school tasks, and more sleep and exercise compared to those who reported no change or deterioration.²¹ Increased efforts to cushion the effects of this global crisis on adolescents are urgently needed and should include

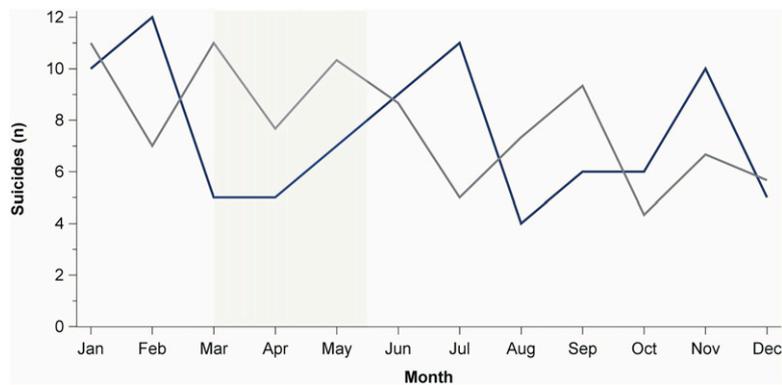


FIGURE 5 Monthly adolescent (10 to 17.9 years) suicides in Germany in 2020. The gray background represents the first lockdown period. Suicide numbers are only available at monthly resolution from the Federal Statistics Office. Blue line indicates 2020, gray line indicates average during reference period.

measures to promote the above-mentioned protective factors.

Limitations of our study are the overrepresentation of university hospitals, which serve as transferal centers for severe cases, and the retrospective design that did not allow to homogenize PICU admission criteria between the centers. SAs were not verified by a standardized protocol, but based on discharge diagnoses. Further, only nonfatal SAs and those with a time lag between the suicidal action and

death could be reported by the PICUs. The small 2020 case numbers in boys make the interpretation of the observed effects less certain compared to girls and the overall cohort. For fatal SAs, official statistics are only available for complete months of 2020 and include cases from 10 to 17.9 years compared to 12 to 17.9 years for the remaining analyses. Because of the limited observation period of 2.5 months per year, seasonal variations of PICU admissions and SAs were not captured by this study.

CONCLUSIONS

After an initial decline of trauma- and injury-related PICU admissions and suicide attempts during the first pandemic wave, there was a drastic increase in admissions and SAs in the same period of 2021. As the pandemic continues, preventive measures and psychosocial support must be offered to adolescents to prevent ongoing damage to their mental health.

ABBREVIATIONS

CI: confidence interval
 DIVI: Deutsche Interdisziplinäre Vereinigung für Intensiv- und Notfallmedizin
 COVID-19: coronavirus disease 2019
 IQR: interquartile range
 PICU: pediatric intensive care unit
 SA: suicide attempt
 SMR: standardized morbidity ratio

Marburg, Marburg, Germany; ^aDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Jena, University of Jena, Jena, Germany; ^bDepartment of Pediatrics, Pediatric Intensive Care Medicine, Catholic Hospital Bochum, Ruhr-University of Bochum, Bochum, Germany; ^cDepartment of Pediatrics, Pediatric Intensive Care Medicine, Community Hospital Koblenz, Koblenz, Germany; ^dDepartment of Pediatrics, Pediatric Intensive Care Medicine, Protestant Hospital Bethel, University of Bielefeld, Bielefeld, Germany; ^eDepartment of Pediatrics, Pediatric Intensive Care Medicine, Hospital Fulda, Fulda, Germany; ^fDepartment of Pediatrics, Pediatric Intensive Care Medicine, Bergmannsheil and Pediatric Hospital Buer, Gelsenkirchen, Germany; ^gDepartment of Pediatrics, Pediatric Intensive Care Medicine, Hospital Leverkusen gGmbH, Leverkusen, Germany; ^hDepartment for Children and Adolescents, Division for Stem Cell Transplantation, Immunology and Intensive Care Medicine, University Hospital Frankfurt, Goethe University, Frankfurt am Main, Germany; ⁱClinic of Pediatric Surgery, Klinikum Ernst von Bergmann, Potsdam, Germany; ^jDepartment of Pediatrics, Pediatric Intensive Care Medicine, Sana Hospitals Duisburg, Duisburg, Germany; ^kDepartment of Pediatrics, Pediatric Intensive Care Medicine, Sana Hospital Offenbach, Offenbach, Germany; ^lDepartment of Pediatrics, Pediatric Intensive Care Medicine, University Hospital Aachen, RWTH Aachen University, Aachen, Germany; ^mDepartment of Pediatrics, Pediatric Intensive Care Medicine, Hospital of Traunstein, Southeast Bavaria Hospitals, Traunstein, Germany; ^{no}Department of Pediatrics, Pediatric Intensive Care Medicine, Florence Nightingale Hospital, Düsseldorf, Germany; ^{np}Department of Pediatrics, Pediatric Intensive Care Medicine, Clemenshospital Münster, Münster, Germany; and ^{qq}Department of Pediatrics, Pediatric Intensive Care Medicine, Cologne Hospitals, Children's Hospital Amsterdamer Str., Cologne, Germany

Dr Bruns conceptualized the study, analyzed and interpreted the data, produced figures, drafted the initial manuscript, and revised the manuscript; Dr Dohna-Schwake conceptualized the study, acquired funding, interpreted the data, and critically revised the manuscript; Ms Willemsen and Holtkamp recruited participating centers, maintained the data set, interpreted the data, and critically revised the manuscript; Drs Stang and Kowall helped to analyze and interpret the data and critically revised figures and the manuscript; Dr Felderhoff-Müser conceptualized the study, acquired funding, and critically revised the manuscript; Drs Kamp, Dudda, Hey, Hoffmann, Blankenburg, Eifinger, Fuchs, Haase, Baier, Andrée, Heldmann, Maldera, Potratz, Kurz, Mand, Doerfel, Rothoef, Schultz, Ohlert, Silkenbäumer, Boesing, Indraswari, Niemann, Jahn, Merker, Braun, Nunez, Engler, Heimann, Brasche, Wolf, Freymann, Dercks, and Hoppenz conceptualized the study, acquired data, and critically revised the manuscript for important intellectual content; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: <https://doi.org/10.1542/peds.2021-055973>

Accepted for publication May 4, 2022

Address correspondence to Nora Bruns, MD, University Hospital Essen, Department of Pediatrics I, Hufelandstr. 55, 45147 Essen, Germany. E-mail: nora.bruns@uk-essen.de

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2022 by the American Academy of Pediatrics

FUNDING: The study received funding from the Stiftung Universitätsmedizin Essen. Dr Bruns received funding from the Medical Faculty of the University of Duisburg-Essen (IFORES program) and from the Stiftung Universitätsmedizin Essen.

CONFLICT OF INTEREST DISCLOSURES: The authors have indicated they have no conflicts of interest relevant to this article to disclose.

REFERENCES

1. Ferrando SJ, Klepacz L, Lynch S, et al. Psychiatric emergencies during the height of the COVID-19 pandemic in the suburban New York City area. *J Psychiatr Res.* 2021;136:552–559
2. Ouğrin D. Debate: Emergency mental health presentations of young people during the COVID-19 lockdown. *Child Adolesc Ment Health.* 2020;25(3):171–172
3. Koenig J, Kohls E, Moessner M, et al; ProHEAD Consortium. The impact of COVID-19 related lockdown measures on self-reported psychopathology and health-related quality of life in German adolescents. *Eur Child Adolesc Psychiatry.* 2021:1–10
4. Mourouvaye M, Bottemanne H, Bonny G, et al. Association between suicide behaviours in children and adolescents and the COVID-19 lockdown in Paris, France: a retrospective observational study. *Arch Dis Child.* 2021;106(9):918–919
5. MacDonald BV, Wong SJ, Maxwell B, Carter C, Sanderson K, Carvalho D. Depression in the pediatric otolaryngology clinic setting. *Laryngoscope.* 2021
6. Mayne SL, Hannan C, Davis M, et al. COVID-19 and adolescent depression and suicide risk screening outcomes. *Pediatrics.* 2021;148(3):e2021051507
7. Ugueto AM, Zeni CP. Patterns of youth inpatient psychiatric admissions before and after the onset of the COVID-19 pandemic. *J Am Acad Child Adolesc Psychiatry.* 2021;60(7):796–798
8. Isumi A, Doi S, Yamaoka Y, Takahashi K, Fujiwara T. Do suicide rates in children and adolescents change during school closure in Japan? The acute effect of the first wave of COVID-19 pandemic on child and adolescent mental health. *Child Abuse Negl.* 2020;110(Pt 2):104680
9. Sokoloff WC, Krief WI, Giusto KA, et al. Pediatric emergency department utilization during the COVID-19 pandemic in New York City. *Am J Emerg Med.* 2021;45:100–104
10. Lee H, Noh Y, Seo JY, Park SH, Kim MH, Won S. Impact of the COVID-19 Pandemic on the Mental Health of Adolescent Students in Daegu, Korea. *J Korean Med Sci.* 2021;36(46):e321
11. Bruns N, Willemsen LY, Holtkamp K, et al. Impact of the First COVID Lockdown on Accident- and Injury-Related Pediatric Intensive Care Admissions in Germany-A Multicenter Study. *Children (Basel).* 2022;9(3):363
12. Liddell FD. Simple exact analysis of the standardised mortality ratio. *J Epidemiol Community Health.* 1984;38(1):85–88
13. Rothman KJ, Greenland S, Lash TL. *Modern Epidemiology*, 3rd ed. Wolters Kluwer Health/Lippincott Williams & Wilkins; 2008
14. Uitenbroek DG. SISA - Simple Interactive Statistical Analysis. Available at: <https://www.quantitativeskills.com/sisa/statistics/smr.htm>. Accessed December 11, 2021
15. Revet A, Hebebrand J, Anagnostopoulos D, Kehoe LA, Gradi-Dietsch G, Klauser P; COVID-19 Child and Adolescent Psychiatry Consortium. Perceived impact of the COVID-19 pandemic on child and adolescent psychiatric services after 1 year (February/March 2021): ESCAP CovCAP survey. *Eur Child Adolesc Psychiatry.* 2021:1–8
16. Carison A, Babl FE, O'Donnell SM. Increased paediatric emergency mental health and suicidality presentations during COVID-19 stay at home restrictions. *Emerg Med Australas.* 2021
17. Cousien A, Acquaviva E, Kernéis S, Yazdanpanah Y, Delorme R. Temporal trends in suicide attempts among children in the decade before and during the COVID-19 pandemic in Paris, France. *JAMA Netw Open.* 2021;4(10):e2128611
18. Yard E, Radhakrishnan L, Ballesteros MF, et al. Emergency department visits for suspected suicide attempts among persons aged 12-25 years before and during the COVID-19 pandemic - United States, January 2019-May 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70(24):888–894
19. Gracia R, Pamiás M, Mortier P, Alonso J, Pérez V, Palao D. Is the COVID-19 pandemic a risk factor for suicide attempts in adolescent girls? *J Affect Disord.* 2021;292:139–141
20. Carballo JJ, Llorente C, Kehrmann L, et al; STOP Consortium. Psychosocial risk factors for suicidality in children and adolescents. *Eur Child Adolesc Psychiatry.* 2020;29(6):759–776
21. Soneson E, Puntis S, Chapman N, Mansfield KL, Jones PB, Fazel M. Happier during lockdown: a descriptive analysis of self-reported wellbeing in 17,000 UK school students during Covid-19 lockdown. *Eur Child Adolesc Psychiatry.* 2022