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Psychological and neurodevelopmental implications of the COVID-19 pandemic in children and adolescents – a review of research and reports

Psychologiczne i neurorozwojowe następstwa pandemii COVID-19 u dzieci i młodzieży – przegląd badań i doniesień

Abstract

The COVID-19 pandemic has affected the lives of people all over the world, including children and adolescents. Despite various clinical images of infection and potential long-term effects of it, there is a wide range of psychological implications resulting from stress, anxiety, and a feeling of helplessness rooted in containment measures and lockdowns. Children and adolescents, as a special group, need determined conditions to develop and learn. Proper development depends on contact with peers, a regular daily schedule, setting new challenges, and, above all, a sense of security that adults should provide. In the time of the global pandemic, these requirements are very difficult to meet. Consequently, we observe an increase in the frequency of appearance of mental disorders in the youngest groups. The article presents current data on the number and type of disorders described in children and adolescents associated with the COVID-19 pandemic, proposed diagnostic tools for these disorders, and recommendations for the management of a child in need of psychological intervention. The problem of neurodevelopmental disorders in children born during the pandemic is also shown. The article uses available, selected scientific studies and data from national and international reports.

Keywords: mental health, neurodevelopmental delay, COVID-19 pandemic, child, isolation.

Streszczenie

Pandemia COVID-19 wpłynęła na życie ludzi na całym świecie, w tym dzieci i młodzieży. Oprócz różnych obrazów klinicznych zakażenia i jego potencjalnych skutków długoterminowych, istnieje szeroki wachlarz następstw psychologicznych wynikających ze stresu, niepokoju i poczucia bezradności, będących efektem stosowania środków ograniczających rozprzestrzenianie się zakażenia i lockdownu. Dzieci i młodzież, jako grupa szczególna, potrzebują określonych warunków do prawidłowego rozwoju. Zależy on od kontaktów z rówieśnikami, regularnego rozkładu dnia, stawiania sobie nowych wyzwań, a przede wszystkim poczucia bezpieczeństwa, które powinni zapewnić im dorośli. W dobie globalnej pandemii wymagania te są bardzo trudne do spełnienia. W związku z tym, obserwujemy wzrost częstotliwości pojawiania się zaburzeń psychicznych w grupach najmłodszych. W artykule przedstawiono aktualne dane dotyczące liczby i rodzaju zaburzeń opisywanych u dzieci i młodzieży w związku z pandemią COVID-19, proponowane narzędzia diagnostyczne służące ich rozpoznawaniu oraz zalecenia dotyczące postępowania z dzieckiem wymagającym interwencji psychologicznej. Przedstawiono również problematykę zaburzeń neurorozwojowych u dzieci urodzonych

w czasie pandemii. W artykule wykorzystano dostępne, wybrane opracowania naukowe oraz danych z raportów krajowych i międzynarodowych.

Słowa kluczowe: zdrowie psychiczne, opóźnienie neurorozwojowe, pandemia COVID-19, dziecko, izolacja.

Introduction

The success of medical discoveries in recent years – vaccines, effective drugs, access to new technologies in medicine – has led us to believe that epidemic outbreaks are history. Severe acute respiratory syndrome (SARS) identified in 2003, the Middle East respiratory syndrome (MERS) in 2012, and the Ebola epidemic in 2016 were undoubtedly alarming, but for many people, remained a part of international news rather than real life-threatening diseases. The Coronavirus Disease (COVID-19) pandemic that we are facing is in many ways different from those above. It is a global problem that, after 2 years from the first reported case in Wuhan (Hubei, China), caused 373 million infections and over 5.6 million deaths worldwide[1]. Significant infectivity and rapid mutations of SARS-CoV-2 – the virus causing COVID-19 – limit epidemic containment efforts, and the wave-like nature of infections does not provide a significant reason for optimism for the near future. Today, we know more and more about the disease caused by SARS-CoV-2. We can identify the groups most at risk of severe infection, and thanks to vaccination programs, we are also able to prevent the severe form of COVID-19 leading to death. We have the tools to diagnose infection with public antigen tests and PCR tests. We are still learning about the long-term effects of SARS-CoV-2 infection, as well as possible clinical presentations of the infection in different age groups, including PIMS (pediatric inflammatory multisystem syndrome) in children. Scientists in international organizations are also searching for an effective drug that would provide a chance to end the pandemic.

In addition to the severity of the disease in infected individuals and the numerous complications that can affect all age groups, the COVID-19 pandemic, due to its long duration and international nature, also has a long-term and universal impact on the mental health of all people living in its times. There are specific groups that appear to be at higher risk of mental health impairment during the pandemic, including healthcare workers, the elderly, children, and others[2]. It is emphasized that those affected by emotional, behavioral, and psychiatric disorders today tend to be more numerous than those affected by COVID-19[3].

[1] https://covid19.who.int/ (Retrieved 01.02.2022).

[2] E.A. Holmes, R.C. O'Connor, V.H. Perry et al., *Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science*, "Lancet Psychiatry" 2020, 7(6), p. 547–560. doi: 10.1016/S2215-0366(20)30168-1.

[3] A.L. Pedrosa, L. Bitencourt, A.C.F. Fróes et al., *Emotional, Behavioral, and Psychological Impact of the COVID-19 Pandemic,* "Front Psychol" 2020, 11, 566212. Published 2020 Oct 2. doi: 10.3389/fpsyg.2020.566212.

In the absence of a vaccine or an effective treatment, the rapid spread of this disease elicited a wide range of responses from different governments across the globe to contain the spread of the pandemic. The 'flattening the curve' strategy (limiting the increase in incidence over time) took different forms. The national policies were aimed at: (a) mitigation, which focuses on slowing but not necessarily stopping epidemic spread – reducing peak healthcare demand while protecting those most at risk of severe disease from infection, and (b) suppression, which aims to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely. Common policies included school closures, travel restrictions, bans on public gatherings, stay-at-home orders, closure of public transportation, emergency investments in the healthcare system, new forms of social welfare provision, contact tracing, and investment in COVID-19 vaccines[4].

Although the term "social isolation" refers primarily to the restriction of a social movement of those infected with the disease, it has also been used to express the source of the subjective sense of loneliness that can accompany measures of social distance, especially for those already at increased risk of suffering from loneliness. In practice, a new concept of "social disconnection" has also emerged to describe the aforementioned feeling of isolation as a result of the implementation of social distance principles[5].

Research and reports on the mental health of children and adolescents

The pandemic affects the health and mental well-being of children and adolescents in multiple ways[6]. The dominant phenomenon is fear and uncertainty about the future. As a short-lived episode, fear and stress are associated with a normal physiological response, but in the face of a pandemic, we are dealing with a chronic pathological form of stress that can be the source of a wide variety of disorders. That uncertainty, which children feel in the context of the pandemic, affects both peer and home environments. Children and adolescents fear prolonged isolation and separation from peers, as well as from family members who live in different households. Children with pre-existing psychiatric disorders such as attention-deficit/hyperactivity disorder (ADHD), anxiety, depression, mood disorders, and behavior

[4] H.W. Chung, C. Apio, T. Goo et al., *Effects of government policies on the spread of COVID-19 worldwide*, "Sci Rep" 2021, 11(1), 20495. Published 2021 Oct 14. doi: 10.1038/s41598-021-99368-9.

[5] N. Parent, K. Dadgar, B. Xiao, C. Hesse, J.D. Shapka, *Social Disconnection During COVID-19: The Role of Attachment, Fear of Missing Out, and Smartphone Use*, "J Res Adolesc" 2021, 31(3), p. 748-763. doi: 10.1111/jora.12658.

[6] N. Chawla, A. Tom, M.S. Sen, R. Sagar, *Psychological Impact of COVID-19 on Children and Adolescents: A Systematic Review*, "Indian J Psychol Med" 2021, 43(4), p. 294–299. doi: 10.1177/02537176211021789.

disorders could be adversely impacted during this stressful situation[7]. In younger groups, children experience decreased physical activity, loneliness, and boredom. Adolescents fear a lack of continuity in education due to school closures and the shift to remote education. It is important to recognize the limited availability of technology devices, especially in families with many children. In addition, many students in the younger grades need adult support in using a computer to participate in remote lessons. In these circumstances, providing optimal learning conditions is a huge challenge for parents and caregivers, as well as educators.

The reports of a study by the Polish organization 'Empowering Children Foundation', published in November 2020, are disturbing. The foundation's report entitled "Negative experiences of youth during the pandemic" concerns a study covering the situation of the spring lockdown in Poland. The study participants were a group of 500 teenagers aged 13–17 years. From the report, one can learn what bothered teenagers the most during more than three months of forced social distance. This was mainly isolation – the lack of possibility of contact with friends (63%) and the need to stay at home (51%). The latter aspect was probably particularly difficult for some people due to the atmosphere among household members (pointed out by 11% of the respondents) and the lack of privacy (5%). Respondents also pointed out problems with remote learning (43%) and lack of information on what future study and exams will look like (33%). The teens surveyed were also concerned about their own and their loved ones' health (16%)[8].

The problems young people face in response to the stress of the pandemic include mood disorders, depression, anxiety, self-cutting, suicidal thoughts, and the use of alcohol and other psychoactive substances. The report mentioned by the 'Empowering Children Foundation' conveys that a characteristic feature of their new charges is the growing phenomenon of abulia, which may be a symptom concurrent with depression, but due to the isolation situation it also appears to be a direct result of the pandemic[9]. The Dictionary of Neurological Signs defines abulia as a "syndrome of hypofunction", characterized by lack of initiative, spontaneity, and drive, apathy, slowness of thought (bradyphrenia), and blunting of emotional responses and response to external stimuli[10]. A young person with abulia seems to lack motivation to take even the simplest action. In the face of social distancing

[7] K. Shah, S. Mann, R. Singh, R. Bangar, R. Kulkarni, *Impact of COVID-19 on the Mental Health of Children and Adolescents*, "Cureus" 2020, 12(8):e10051. Published 2020 Aug 26. doi: 10.7759/cureus.10051.

[8] https://fdds.pl/co-robimy/raporty-z-badan/2020/negatywne-doswiadczenia-mlodziezy-w-trakcie-pandemii-2020.html (Retrieved 01.02.2022).

[9] https://programyrekomendowane.pl/strony/zdrowie-psychiczne-mlodziezy-w-czasie-pandemii-covid-19,422 (Retrieved 01.02.2022).

[10] J.M. Das, A. Saadabadi, *Abulia* [In:] *StatPearls*. Treasure Island (FL): StatPearls Publishing; November 21, 2021.

and national government encouragement to stay home, young people with abulia may spend their days in front of the television, a computer, or a smartphone, staring at the screen in an apathetic stupor. These individuals have a strong reluctance to socialize with friends with whom they previously enjoyed spending time. They do not see the point of maintaining existing interpersonal relationships and tend to turn inward.

Economic factors also have a significant impact on well-being and mental health, especially in the face of a global pandemic. The economic recession may be accompanied by an increase in domestic violence and child maltreatment, both drastically influencing the mental health of children[11]. Based on the data in the rest of the quoted report, we can certainly conclude that staying home did not protect adolescents from experiencing harm. According to the report, 27,2% of respondents aged 13–17 years experienced at least one of the studied forms of harm between mid-March and the end of June – the spring lockdown in Poland. Almost one in nine (10.8%) 13–17-year-olds experienced violence by close adults in a given period. It was mainly mental abuse (9,2%), but also physical abuse (3,2%). One in 20 respondents (5.4%) witnessed domestic violence. Among the situations analyzed, there were both situations of violence by an adult against a child, witnessed by 3.6% of the adolescents, and situations of violence between parents/guardians, witnessed by 2.4% of the adolescents. One in ten respondents (10,2%) experienced sexual abuse in a given period. Mostly, it was sexual abuse without physical contact (9,2%) in the form of exhibitionism (5,2%), verbal sexual violence (4,6%), and online recruitment for sexual purposes (3,4%). During the first period of the pandemic, 2.9% of respondents aged 15–17 attempted to commit suicide. In the face of such a difficult and complex situation, one may wonder whether and if so where young people sought help since they often could not feel safe in their family environment. It turns out that in the vast majority – as many as 87% – people could count on the help of at least one person (with 52% of respondents having several and 12% having many such trusted people). However, 9% of the respondents were not trusted by anyone. Importantly, such an answer was given significantly more often (17%) by those teenagers who experienced harm during the first period of the pandemic and therefore needed the most support. And on whose support in the home environment could young people count on? The respondents most often mentioned the help of the mother (67%), less often from the father (40%). Colleagues also play a very important role (43%)[12].

[11] J.M. Fegert, B. Vitiello, P.L. Plener, V. Clemens, *Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality,* "Child Adolesc Psychiatry Ment Health" 2020, 14, 20. Published 2020 May 12. doi: 10.1186/s13034-020-00329-3.

[12] https://fdds.pl/co-robimy/raporty-z-badan/2020/negatywne-doswiadczenia-mlodziezy-w-trakcie-pandemii-2020.html (Retrieved 01.02.2022).

Interesting information is provided in the report on the functioning of the 116 111 Helpline for Children and Youth. It is the first nationwide, toll-free, 24-hour phone number for children and youth in Poland. This is a helpline that any child in need of support can call. All consultants are specially trained psychologists, educators, or social science students. Their goal is to assist minor callers. If a caller declares suicidal intent or reports events that threaten his life or health (e.g. violence), the helpline consultants will take action to ensure his safety. The consultants may intervene by informing the Police Headquarters about the situation, contacting the emergency number 112, or undertaking local activities – e.g. contact with a school, court, social assistance center, or an adult from the child's environment. Over the years, the Helpline has expanded its work to include the ability to contact those in need of help by text message. In a summary of 12 years of work the Helpline has answered over 1.3 million calls, received over 78 thousand messages, and intervened 2508 times in life-threatening situations. The available statistical analysis shows how the help-seeking data through the helpline during the COVID-19 pandemic period compared to the data prior to that period.

As Helpline consultants summarize, 2020 was a breakthrough year in terms of the number of messages sent, interventions, and calls received. Comparing it to the previous year, one can see that the number of calls received was twice as low, while the number of messages sent almost doubled. At the same time, and very worryingly, the number of interventions made also doubled. These data could have been influenced by many factors, but the main reason was the COVID-19 pandemic. Analyzing data from the individual months of 2020 in March and April, one can see an increase in the demand for consultants' help. This time coincides with the period of the tightest restrictions due to the spread of the SARS-CoV-2 virus and the increase in infections across the EU. The temporary closure of schools and selected workplaces as well as restrictions on movement have largely affected children and young people. It should be noted that the number of messages received by consultants, in particular, increased significantly at that time compared to telephone calls. The main factor, which according to teenagers had an impact on this, was the lack of suitable conditions for conversation. The presence of a parent or other adult behind the wall increased the anxiety that someone might overhear or interfere with the conversation. According to the consultants, there were conversations during which an adult appeared in the child's environment and the child pretended to talk to a peer. The restrictions made free phone contact with Helpline consultants much more difficult, so young people started to write messages more often.

The problems that youth and children reported most frequently were related to mental health, perceived anxiety, tension, depressive states, and loneliness. The collected figures show that the topic of anxiety came up in 15% of all contacts (online messages and phone calls). Perceived tension/anxiety was mentioned by youth and children in 19% of conversations and messages, while the topic of depression

and low mood states occurred in 11% of them. Loneliness was mentioned in 7% of all contacts. The interviewees also addressed the topic of self-injuring behavior. The largest increase in reported problems in this area occurred during the spring lockdown. The self-injurious behaviors reported with the greatest increase during this time included self-cutting with 4% of calls and messages, suicidal thoughts with 8%, suicide attempts with 2%, and suicidal intent with 1%[13].

When analyzing the topic, it is also worth looking at data outside our country, as the problem of mental health in children and youth is widespread. According to the latest available UNICEF data, globally, at least 1 in 7 children has been directly affected by lockdowns, while more than 1.6 billion children have suffered some loss of education. The disruption of routines, education, recreation, as well as concerns for family income and health, leaves many young people feeling afraid, angry, and concerned about their future. In UNICEF's most comprehensive look at the mental health of children, adolescents, and caregivers in the 21st century, The State of World Children 2021; On My Mind: Promoting, Protecting and Care for Children's Mental Health, the authors highlight that even before COVID-19, children and young people carried the burden of mental health conditions. They state that more than 1 in 7 adolescents aged 10–19 is estimated to live with a diagnosed mental disorder globally. Almost 46,000 adolescents die from suicide each year, among the top five causes of death for their age group[14].

The American Psychological Association is also highlighting a child and adolescent mental health crisis related to the epidemiological situation[15]. In a 2020 survey of 1,000 parents across the country facilitated by the Ann & Robert H. Lurie Children's Hospital of Chicago, 71% of parents said the pandemic had taken a toll on their child's mental health, and 69% said the pandemic was the worst thing to happen to their child. Among the most destructive and unhealthy factors affecting their children's health in the pandemic, parents pointed to social isolation (30%), remote learning (27%), and too much screen time (22%). 64% of the respondents believed that the pandemic will have a lasting effect on their child and almost as many declared that they believe that mental health consequences will be greater for children than for adults[16]. A national survey of 3,300 high schoolers aged 13–19, conducted in spring 2020, found 30% of students felt unhappy and depressed much more than usual. The authors conclude that students are experiencing collective trauma and that they and their families would benefit

[13] P. Dąbrowska, *Zdrowie psychiczne dzieci i młodzieży w roku 2020 na podstawie rozmów w 116 111 – telefonie zaufania,* „Dziecko Krzywdzone. Teoria, Badania, Praktyka" 2021, 20(2), s. 63–75.

[14] https://unicef.pl/co-robimy/aktualnosci/dla-mediow/problemy-zdrowia-psychicznego-u-dzieci-w-czasie-pandemii-covid-19-to-wierzcholek-gory-lodowej (Retrieved 01.02.2022).

[15] https://www.apa.org/monitor/2022/01/special-childrens-mental-health (Retrieved 01.02.2022).

[16] https://www.luriechildrens.org/en/blog/childrens-mental-health-pandemic-statistics/ (Retrieved 01.02.2022).

from immediate and ongoing support for basic needs, physical and mental health, and learning opportunities[17].

The comprehensive study by Elizabeth A Rider, Eman Ansari, Pamela H Varrin, and Joshua Sparrow features further figures and reports from Europe and the United States on the given topic[18]. Data from analyzed studies suggest an increased frequency of mental health disorders during the pandemic. Furthermore, according to the authors, previous mental health problems increase the risk of pandemic-related mental health trauma. Research supporting these statements includes a longitudinal probability study that evaluated youth in 2017 and 2020 (England)[19], a retrospective comparison of suicide ideations and attempts during the COVID-19 pandemic (January–July 2020) and a year before (January–July 2019) based on pediatric emergency department experiences in that time (USA)[20], and a similar study of suspected suicide attempts between March 2020 and May 2021 compared with the same periods in 2019 (USA)[21]. In addition to further evidence of the association of the pandemic with mental health deterioration in the pediatric population, useful age-appropriate tools for assessing the mental health of children and adolescents are presented. These screening tools are used mainly by clinicians[22], but some, such as the Ask Suicide-Screening Questions (ASQ) Toolkit, are available on the Internet with an interpretation of the score and further steps one can take to reach appropriate help[23]. Simple and brief mental health screening, including programs that consider the whole family, can be used to help assess emotional symptoms, behavioral functioning symptoms, and psychosocial symptoms. Based on the results of the mental health assessment, appropriate steps can be taken to help the person in need. It is somewhat easier for the facilitator – especially a health professional who works with children daily – to use the stepwise model of management adapted from the Pediatric Preventative Psychosocial Health Model and the Multi-tiered

[17] https://eric.ed.gov/?id=ED606305 (Retrieved 01.02.2022).

[18] E.A. Rider, E. Ansari, P.H. Varrin, J. Sparrow, *Mental health and wellbeing of children and adolescents during the covid-19 pandemic,* "BMJ" 2021, 374:n1730. Published 2021 Aug 24. doi: 10.1136/bmj.n1730.

[19] mhcyp_2020_rep.pdf (digital.nhs.uk) (Retrieved 01.02.2022).

[20] R.M. Hill, K. Rufino, S. Kurian, J. Saxena, K. Saxena, L. Williams, *Suicide Ideation and Attempts in a Pediatric Emergency Department Before and During COVID-19*, "Pediatrics" 2021, 147(3):e2020029280. doi:10.1542/peds.2020-029280.

[21] E. Yard, L. Radhakrishnan, M.F. Ballesteros 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, p. 888–894. DOI: 10.15585/mmwr.mm7024e1external icon.

[22] https://missionhealth.org/wp-content/uploads/2018/04/Adolescent-Depression-Screening--PHQ-A-Form.pdf (Retrieved 01.02.2022).

[23] https://www.nimh.nih.gov/research/research-conducted-at-nimh/asq-toolkit-materials (Retrieved 01.02.2022).

System of Support Model[24]. The proposed actions assume universal care for patients who present an expected overall development and are resilient and coping despite a stressful situation. Targeted care is intended for patients with increased distress, preexisting stressors, and acute disruptions of functioning in developmental domains. The highest level of disturbances that require clinical treatment is recognized when the patient presents severe, escalating distress, with behavioral and function responses that are disruptive to the patient and his/her environment[25]. Among the most important symptoms whose presence requires immediate specialized help are: suicide attempt, suicidal ideation, intent or plan; self-cutting; intense fear, anxiety, dissociative symptoms, especially if they influence basic areas of functioning; uncontrollable grief; intrusive thoughts or cognitive impairment. In life-threatening and health-threatening situations, including increased psychiatric symptoms, it is advisable to seek help from the emergency number 112, the emergency department, or (if available) the emergency room with an on-call psychiatrist. The government website also presents a list of inpatient units, outpatient units, support groups, and community organizations, along with contact numbers where anyone can go if their mental health deteriorates[26].

Wide gaps persist between mental health needs and mental health funding. The UNICEF report finds that about 2% of government health budgets are allocated to mental health spending worldwide. Data collected from Polish registers also draw attention to the huge underfunding of child psychiatry and the lack of specialists in this field. In Poland, 9% of children and adolescents under 18 years of age, or approximately 630,000, require assistance from the psychiatric and psychological treatment system. Meanwhile, the report from the Supreme Audit Office (NIK) shows that the psychiatric treatment system for children and adolescents does not provide this population of patients with comprehensive and universally accessible psychiatric care. In March 2019, 419 doctors were practicing pediatric and adolescent psychiatry, and 32% of the specialists were over 55 years old. The national consultant in pediatric and adolescent psychiatry indicated a shortage of approximately 300 physicians in this specialty. Attention was paid to the low interest in specializing in this area by doctors starting to work in the profession, and thus to the likely worsening of staff shortages in the future. According to the report, the biggest problem is the uneven distribution of pediatric and adolescent psychiatrists throughout the country, which has already been observed. The lowest number of physicians per 100,000 minors was in the Lubusz Voivodeship (0.16)

[24] A.E. Kazak, *Pediatric Psychosocial Preventative Health Model (PPPHM): Research, practice, and collaboration in pediatric family systems medicine*, "Families, Systems & Health" 2006, 24(4), p. 381–395. DOI: 10.1037/1091-7527.24.4.381.

[25] E.A. Rider, E. Ansari, P.H. Varrin, J. Sparrow, *Mental health… op. cit.*

[26] https://www.gov.pl/web/koronawirus/gdzie-znajdziesz-pomoc-w-przypadku-pogorszenia-stanu-psychicznego (Retrieved 01/02/2022).

and the highest in the Lodzkie Voivodeship (0.79). The smallest number of psychiatrists per 1,000 minors was in the Subcarpathian Voivodeship (1.02), and the largest number was in the Lodzkie Voivodeship (4.96). The psychiatric wards of the hospitals for children and adolescents were also unevenly distributed throughout the country (there were no in the Podlaskie Voivodeship) and the day wards (there were no in five provinces – Lubusz, Opole, Świętokrzyskie, Warmian-Masurian, and West Pomeranian Voivodeships). Insufficient funding for psychiatric care for children and adolescents was also a problem. The funds transferred to hospitals by the National Health Fund did not cover the costs of patient treatment. Long waiting times for admission to both the department and the outpatient psychiatric clinic were observed. There is also a lack of prevention efforts in child and adolescent mental health. Due to the shortage of specialists, it is not commonly performed within the clinic, but at the same time, it does not work sufficiently within the educational system (school pedagogue, school psychologist). Almost half of the public schools of various types (44%) do not employ a pedagogue or a psychologist in separate posts. Where they do exist, the prevention of mental disorders in school is hindered by a large number of students per teacher or psychologist.

The Supreme Chamber of Control formulated four main conclusions and forwarded them in the form of recommendations to the Ministry of Health: Reduction of territorial differentiation in access to psychiatric care services; Development of a model for forecasting the demand for specialist doctors; Even distribution of centers and training places; Determine indicators for the minimum number of child and adolescent psychiatrists[27].

Pandemic children

When considering child and adolescent mental health problems in the face of a pandemic, one cannot forget the youngest age group, children born during this difficult time and called ‘pandemic children’. These children are now 2 years old, and the reality around them – with social distance, limited interpersonal contact, personal protective measures – is the only one they know. Initial casual observations of developmental delay in “pandemic children”, through increasing reports and studies on larger groups of children, are beginning to form a disturbing trend[28]. A study published in early 2022 looked for an association between maternal SARS-CoV-2 infection during pregnancy, birth during the COVID-19 pandemic regardless of maternal SARS-CoV-2 status, and child neurodevelopment at 6 months of age. In this cohort study of 255 babies born

[27] https://www.nik.gov.pl/aktualnosci/lecznictwo-psychiatryczne-dzieci-i-mlodziezy.html

[28] M. Moyer Wenner, *The COVID generation: how is the pandemic affecting kids’ brains?* “Nature” 2022, 601(7892), p. 180–183. doi:10.1038/d41586-022-00027-4.

between March and December 2020, exposure to maternal SARS-CoV-2 infection was not associated with differences in any subdomain of the Ages & Stages Questionnaire (3rd Edition) at 6 months of age, regardless of the time or severity of the infection. However, exposed and unexposed infants born during that period had significantly lower scores in the gross motor, fine motor, and personal-social subdomains compared to a historical cohort of infants born before the onset of the COVID-19 pandemic[29]. Another fascinating analysis is offered by the RESONANCE study staff. Since 2009, Brown University and the Warren Alpert Medical School at Brown University have been the home of a longitudinal study of child health and neurodevelopment, termed the RESONANCE study. Now, the RESONANCE cohort consists of approximately 1600 caregiver-child dyads, who have been continuously enrolled between 0 and 5 years of age since 2009 and have been followed through infancy, childhood, and early adolescence in search of patterns of neurodevelopmental delays appearing. Therefore, this cohort offers a unique opportunity to explore the impact of the COVID-19 pandemic on child health trends. Researchers tested the cognitive performance of 600 children (aged 3 months to 3 years) including 39 babies born during the pandemic. The measured verbal, nonverbal, and overall cognitive scores were significantly lower since the beginning of the pandemic. In addition, children born before the pandemic and followed through the initial stages of development do not show a reduction in skills or performance, but young infants born since the beginning of the pandemic show significantly lower performance than infants born before January 2019. The authors also found that babies from low-income families experienced the largest performance drops, that boys were more affected than girls, and that gross motor skills were the most affected. In conclusion, the results seem to suggest that early development is affected by the environmental conditions caused by the pandemic[30]. The observed phenomenon might be related to the change in everyday life that we have all experienced in the past two years and that seems to especially affect infants. This means less interaction with parents and caregivers due to different factors, also social and economic ones, fewer interactions with other children, less physical activity, and playtime. Despite initial concerns, early data suggest that mask use has not negatively affected child emotional development[31].

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[29] L.C. Shuffrey, M.R. Firestein, M.H. Kyle et al., *Association of Birth During the COVID-19 Pandemic With Neurodevelopmental Status at 6 Months in Infants With and Without In Utero Exposure to Maternal SARS-CoV-2 Infection*, "JAMA Pediatr", Published online January 04, 2022. doi: 10.1001/jamapediatrics.2021.5563.

[30] S.C.L. Deoni, J. Beauchemin, A. Volpe, V. D'Sa, *The RESONANCE Consortium. Impact of the COVID-19 Pandemic on Early Child Cognitive Development: Initial Findings in a Longitudinal Observational Study of Child Health,* "medRxiv" 2021.08.10.21261846. doi: 10.1101/2021.08.10.21261846.

[31] E. Tronick, H. Als, L. Adamson, S. Wise, T.B. Brazelton, *The infant's response to entrapment between contradictory messages in face-to-face interaction,* "J Am Acad Child Psychiatry" 1978 Winter, 17(1), p. 1–13. doi: 10.1016/s0002-7138(09)62273-1. PMID: 632477.

It is also emphasized that pandemic-related stress during pregnancy could negatively affect fetal brain development in some children and cause poor performance in listed tests compared to pre-pandemic born children. A longitudinal study enrolled in units in Italy in 163 mother-infant dyads was to provide data on prenatal stress, perceived social support, postnatal anxiety symptoms, parenting stress, mother-infant bonding, and infant regulatory capacity at 3 months of age[32]. Further trials on the topic are planned. One of them is an observational cross-sectional study registered with recruiting status on ClinicalTrials.gov (Identifier: NCT04713150). The purpose of this study is to advance the scientific understanding of how prenatal COVID-19 infection and associated psychological distress influence infant neurodevelopment. This project will aim to shed light on how families and child development are affected by the current COVID-19 pandemic and will work to better support these families and children as they grow[33]. Currently, there is no data on neurodevelopment and potential deviations in Polish newborns and children born during the pandemic, the so-called 'pandemic children'.

Recommendations

In response to the growing need for psychological and psychiatric care of children and adolescents, as well as the possible negative consequences of not providing this assistance, government and non-governmental organizations address guidelines and recommendations to parents and guardians of the minors. The Polish government has constructed 10 tips on how parents can take care of their child's well-being as part of the program to protect the mental health of children and adolescents. In addition to the obvious indications of protecting against exposure to SARS-CoV-2 virus infection and caring for the child's physical health, there is a strong emphasis on maintaining contact with the child, making them feel safe, encouraging them to share concerns, communicating age-appropriate content, and limiting access to information and images that could exacerbate anxiety and fear[34]. In response to growing demand, child and adolescent mental health websites run by national and international organizations offer a variety of resources for parents and caregivers of children (including those with special

[32] L. Provenzi, S. Grumi. L. Altieri et al., *Prenatal maternal stress during the COVID-19 pandemic and infant regulatory capacity at 3 months: A longitudinal study*, "Development and Psychopathology" 2021, p. 1–9. doi: 10.1017/S0954579421000766.

[33] https://clinicaltrials.gov/ct2/show/NCT04713150?term=pandemic&cond=Development%2C+-Child&draw=3&rank=1 (Retrieved 01.02.2022).

[34] https://www.gov.pl/web/koronawirus/ochrona-zdrowia-psychicznego-dzieci-i-mlodziezy (Retrieved 01.02.2022).

needs) to help explain to their children what a pandemic is, to support them when they are anxious, or to find ways to make meaningful use of their time spent with their child[35]. Efforts to support children and adolescents during a pandemic should also include mitigating the difficulties of returning to stationary schooling and adjusting to new post-pandemic conditions and living arrangements that may remain unchanged for many years to come.

The National Consultant in Child and Adolescent Psychiatry, during the Third Mental Health Congress in June 2021, pointed out several examples of studies on this topic with expert recommendations. Some of the most recommended are as follows. Guidelines for actions aimed at students and parents and teaching staff after returning to schools and institutions, published by the Ministry of National Education[36]; Supporting your children return to school during COVID-19: a study published by UNICEF[37]; US government study on strategies for reopening schools after lockdown: US Department of Education[38].

There is a need to ameliorate children and adolescents' access to mental health services. For this, a collaborative network of parents, teachers, psychiatrists, psychologists, pediatricians, community volunteers, and non-government organizations is required. This cooperation would be crucial to prevent during and post-pandemic mental challenges in the most vulnerable and underprivileged section of society. The focal point of the health care system and policymaking should be prevention, promotion, and interventions corresponding to the public mental health system to meet the mental health needs of the population at large[39].

In the United States, the challenge of financially supporting schools during a pandemic has been posed. The American Rescue Plan Act, passed in March 2021, included $170 billion, and many schools used these funds to hire mental health professionals, including psychologists. In some districts, there are training programs for teachers, where they can learn basic social and emotional skills to help students cope with stress and anxiety, making the teacher the first person who can provide

[35] https://emergingminds.org.uk/wp-content/uploads/2020/04/COVID19_porady-dla-rodzico%CC%81w-i-opiekuno%CC%81w-002.pdf (Retrieved 01.02.2022); https://www.anagomez.org/wp-content/uploads/dlm_uploads/2020/06/OysterandButterfly-Polish.pdf (Retrieved 01.02.2022); R. Ghosh, M.J. Dubey, S. Chatterjee, S. Dubey, *Impact of COVID -19 on children: special focus on the psychosocial aspect,* "Minerva Pediatr" 2020, 72(3), p. 226–235. doi:10.23736/S0026-4946.20.05887-9.

[36] https://www.gov.pl/web/edukacja-i-nauka/wytyczne-dotyczace-dzialan-skierowanych-do-uczniow-i-rodzicow-oraz-kadry-pedagogicznej-po-powrocie-do-szkol-i-placowek (Retrieved 01.02.2022).

[37] https://www.unicef.org/rosa/stories/supporting-your-children-return-school-during-covid-19 (Retrieved 01.02.2022).

[38] https://www2.ed.gov/documents/coronavirus/reopening-2.pdf (Retrieved 01.02.2022).

[39] S. Singh, D. Roy, K. Sinha, S. Parveen, G. Sharma, G. Joshi*, Impact of COVID-19 and lockdown on the mental health of children and adolescents: A narrative review with recommendations*, "Psychiatry Res" 2020, 293, 113429. doi: 10.1016/j.psychres.2020.113429.

psychological help to a child. This solution involves equipping children with the skills to deal with stress as early as in the school classroom, which will significantly relieve the burden on psychologists, whose shortage was already noticeable before the pandemic outbreak in 2019. Many teachers do not feel prepared to deal with their students' problems, especially if the problem areas include trauma or grief. Thus, programs to develop teachers' psychological competence are designed to help them recognize the symptoms of such conditions in their students and to provide effective prompt assistance[40].

Conclusions

The COVID-19 pandemic, which we have been facing for more than two years, poses tremendous challenges for both health care providers and those not directly involved in health care. We still do not know how long the restrictions related to the risk of virus transmission will last, we are waiting for the discovery of an effective and widely available drug, and the distant effects of being infected with SARS-CoV-2 are also unknown. It is unclear what difficulties the generation of children born during a pandemic, commonly referred to as 'pandemic children', will face. The results of ongoing scientific research are likely to shed new light on at least some of these issues. What we do know is that the prolonged anxiety and stress associated with the epidemic situation are taking their toll on mental health, including that of children and adolescents. The interesting national and international data presented in this paper show that the increasing number of reported mental health problems in the youngest patient group is a global problem that we should all pay attention to. Of particular concern are the figures for suicide attempts, self-harm, and violence suffered or witnessed by children during the lockdown.

This alarming trend requires the involvement of adults from the child's closest environment, parents, and teachers, as well as the introduction of systemic solutions. Training programs, introduced, for example, by the United States, assume that parents and teaching staff should be the first line of support for children and adolescents in mental crisis, especially in a situation of overloaded mental health care units, psychiatrists, psychologists, and psychotherapists. Training is designed to provide adults with the tools to quickly identify and respond to mental disorders in a child. Furthermore, the Internet, as the most common and easily accessible source of information, on the websites of scientific societies and health organizations, provides parents with guidance and direction on how, with age-appropriate tools, to help a child overwhelmed by an epidemic situation.

[40] https://www.apa.org/monitor/2022/01/special-childrens-mental-health (Retrieved 01.02.2022).

The systemic solutions proposed by the Polish government aim to alleviate staff shortages in the field of pediatric and adolescent psychiatry and allow greater access to specialists in the coming years by increasing the number of training places for young physicians.

This work may be beneficial in spreading awareness of the current mental health plight of children and adolescents. The discussed topic may turn out to be interesting both for adults working with children and adolescents daily, as well as for the parents of children themselves. The dynamics of the epidemic situation and the disturbing reports presented in this article suggest that further analyses and reports on mental health disorders related to the pandemic should be expected.

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