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Negative content

The representation of negative content in children's drawings showed also an opposite trend, with 2% (2/102) before, 19% (19/102) during, and 5% (5/102) after the COVID-19 pandemic. The representation of negative content was higher during the COVID-19 pandemic compared to before (p-value<0.001) and after (p-value=0.006).

Movements

Movement representation in children's drawings showed also an opposite trend, with 40% (41/102) before, and a significant increase from 28% (29/102) during the COVID-19 compared to 42% (43/102) after the COVID-19 pandemic (p-value=0.03).

Classification items

COVID-19 references

The representation of references to COVID-19 in children's drawings was 2% (2/102) for the period before the COVID-19 pandemic.

In general, COVID-19 elements were present in almost all the drawings for the pandemic time. Children represented at least one element of the COVID-19 pandemic in 73% of drawings (74/102), such as face masks, distance, school or governmental measures, closed schools, houses, hydro-alcoholic gel, etc. After the pandemic, 13% of children (13/102) kept items related to the COVID-19 pandemic in their drawings. The representation of COVID-19 references was higher during (p-value<0.001) and after COVID-19 (p-value=0.009) compared to before. The representation of COVID-19 was also higher during COVID-19 compared to after the pandemic (p-value<0.001).

School references

The representation of a school in children's drawings was 93% (95/102) before, 75% (76/102) during, and 82% (84/102) after the COVID-19 pandemic. The representation of the school was higher before the COVID-19 pandemic compared to the other periods (p-value<0.001, and p-value=0.006).

Self-representation

Self-representation in children's drawings was unchanged, with 91% (93/102) before, 92% (94/102) during, and 90% (92/102) after the COVID-19 pandemic.

Friends

The representation of friends in children's drawings had also a V shape across time, with 41% (42/102) before, 31% (32/102) during, and 42% (43/102) after the COVID-19 pandemic.

The house

The representation of home in children's drawings was only 3% (3/102) before; it increased to 20% (20/102) during the pandemic, and returned to 5% (5/102) after the COVID-19 pandemic.

Structure items

Color(s)

The use of color(s) has been represented in 80% of children's drawings (82/102) before the pandemic, 82% (84/102) during the pandemic, and 79% (81/102) after the pandemic. Before the pandemic, 36% of them (37/102) used at least 5 different colors. During the COVID-19 pandemic, this proportion fell to 28% of them (29/102), and it went back to 34% (35/102) in drawings for after the pandemic.

Other persons

The representations of person(s) were used in 96% of children's drawings (98/102) before the pandemic. Similar proportions were reported for the other periods.

COVID-19 item(s)

The representation of a COVID-19 element in children's drawings was 2% (2/102) before the COVID-19 pandemic. It increased to 73% (74/102) for the pandemic period, but it remained at 13% (13/102) for the post-pandemic time.

Wellbeing item(s)

The representations of wellbeing element(s) were 66% in children's drawings (67/102) before the pandemic. This proportion fell drastically to 20% during the pandemic and went back to 69% after the pandemic. The representation of wellbeing items was lower during the COVID-19 pandemic compared to after the pandemic (p-value<0.001).

Size

The representation of different sizes in drawing elements over the period in the children's drawings was 40% (41/102) before, 38% (39/102) during, and 39% (40/102) after the COVID-19 pandemic.

Some particularities in drawings deserved attention

One child remembered the previous study and represented the survey team in his drawings (see supplementary material N°1). Some children drew items associated with sadness (tears, sad faces, clouds, dark colors) and items associated with joy (butterflies, flowers, sunshine, etc.). For example, in this drawing, the child has drawn a sun that is crying, rain, self-representation with one tear, but also a rainbow, which is a representation of joy, and peace (see supplementary material N°2). Isolation was represented in some of the drawings. For example, one child drew himself or herself behind the bars of a prison (see supplementary material N°3). One child was happy to stay at home during the COVID-19 pandemic and then return to school as normal (see supplementary material N°4). One child integrated the war in Ukraine after

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the pandemic. He or she also integrated the problem of the large quantity of waste generated by the pandemic, with the overturned dustbins full of masks (see supplementary materials N°5). Many children remembered the protective measures implemented at school during the pandemic. He or she represented the distance measures, the masks, and the separated break time per grade (see additional materials N°6). A child has represented the government meetings (see additional materials N°7).

Discussion

The COVID-19 pandemic has disrupted daily life around the world, with many consequences for everyone. It is important to monitor the wellbeing of the population after the epidemiological crisis, to document developments, and to take action if necessary. Documenting changes in children's wellbeing is essential, as most mental health problems develop during childhood. The pandemic has had consequences that extend beyond the end of the lockdown, such as the economic crisis, heightened feelings of insecurity and uncertainty about the future. Children's participation rate in this study was low in all schools except one, with a participation rate of 50%, which represented 44% of the total sample. Staff participation was very low in our study, with only 10% of adults accepted to join. Such a low proportion reflected maybe the overpressure of the pandemic period.

Wellbeing

Before the COVID-19 pandemic, the prevalence of anxiety and depression in children aged 0-9 years were <1% and <0.1% worldwide, 2% and 0.2% in Belgium respectively. In adults (aged over 20 years old), they were 5% each worldwide, 6% and 5% in Belgium respectively [24]. The Institute For Health Metrics And Evaluation has estimated that 15% of the total number of years lived with disability worldwide were due to mental disorders in 2019. In 2020, anxiety and depressive disorders due to the COVID-19 pandemic were 28%, nearly two times higher than in 2019 [25]. In 2020, a study conducted in 204 countries and territories reported a 26% increase in anxiety disorders and a 28% increase in depressive disorders after adjusting for the COVID-19 pandemic. The prevalences also revealed a bigger change in younger age groups, which could indicate the impact of social restrictions and school closures [2].

We investigated anxiety during COVID-19 crisis in a previous study, in the same schools. During the COVID-19 pandemic crisis, 53% had anxiety symptoms, and 31% had a definite state of anxiety [13]. After the COVID-19 pandemic crisis, 63% had anxiety symptoms, and 38% had a state of definite anxiety. A comparison between the two studies for the same participating children suggested that anxiety levels have worsened after the COVID-19 pandemic crisis. These results are in line with literature. In the World Health Organization report, many people became more anxious with the SARS-CoV-2 virus and, for some, the pandemic amplified serious mental health problems [1]. The long COVID-19 or post-acute sequelae of SARS-CoV-2 may be one of the reasons for the deterioration in wellbeing. Mood changes are typical symptoms described in these post-acute sequelae [26]. A study conducted in UK addressed the effect of SARS-CoV-2 infection on cognitive functions. It showed that infection with the SARS-CoV-2 virus led to cognitive dysfunction depending on the severity of the COVID-19 disease and whether the symptoms were persistent and unresolved [27, 28]. Two-thirds of children had symptoms of social desirability and 55% had a definite state of social desirability. The high social desirability score and the negative correlation between social desirability and anxiety scores suggest that anxiety scores were underestimated. Especially in younger children (6-7 years old) the social desirability scores were the highest. Regarding the comparison of scores for children who participated in both studies, anxiety scores were higher after the pandemic crisis than during. In contrast, social desirability scores were lower after the COVID-19 pandemic crisis. One principal was very interested in an adapted questionnaire for children. She expressed the need to adapt questionnaires according to the age of the child with relevant questions. A specific questionnaire on school premises can help school staff monitor children's wellbeing and refer them to the appropriate people in order to limit the consequences in the future. Wellbeing has deteriorated over time. Even though schools were not closed during the lockdown period in Belgium, the COVID-19 pandemic and its consequences have left their mark on the children. A comparison between anxiety scores and depression scores over time was not possible due to the low staff participation rate in this study. One possible answer to this could be that staff wish to move on and not think about the pandemic. For example, one of the school's principals said that the majority of his staff did not want to take part in the survey because they were so tired of hearing about the pandemic. Which is also a sign of wellbeing and personal development, to want to move on and look to the future.

Wellbeing in drawings

Expressing themselves orally in the right words is not always easy for children. Children express themselves more easily through drawings, and most of them enjoy drawing. The wellbeing expressed in drawings can be a challenge to interpret, as every child is different. The drawings are in some way a representation of their world, and the investigators need appropriate tools to interpret the drawings. A school is a place of learning in terms of knowledge, but also of interaction with others and personal development. The COVID-19 pandemic has compromised these different aspects with various protective measures, confinement, limitation of outdoor activities, etc. By comparing the three drawings,

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the investigators were able to investigate the children's perception of their wellbeing over different temporalities. A specific scale was adapted to be as accurate as possible in terms of interpretation. At the same time, each drawing was carefully analyzed to identify specific indications and interpretations.

The representation of isolation and the absence of green spaces suggest a deterioration in wellbeing. The period of the COVID-19 pandemic crisis was a time of confinement and restricted movement. Studies have shown the benefits for wellbeing and mental health of access to green and blue spaces [29–33]. Only 16% of children did not like drawing and were minimalist in their drawings (almost no use of varied colors, few additional elements apart from the instructions, few elements relating to wellbeing, etc.). This limits misinterpretation as the drawings did not provide contradictory information. Conversely, it may also indicate social desirability and that the children are responding to what is expected of them. Only 3% of children admitted they never drew and 17% admitted to rarely drawing. The representation of positive facial expressions was 17% in their drawings during the pandemic, against 73% before, and 63% after the pandemic. Positive contents were included in 20% of drawings during the pandemic, against 47% before and 49% after. Negative facial expressions were reported in 31% during the pandemic, against 3% before and 6% after. Negative contents were included in 19% of their drawings during the pandemic, against 2% before and 5% after. During the COVID-19 pandemic, the protective mask covered the face, so the children depicted masks on people's faces, illustrating the difficulty of interpreting facial expressions in real life, but also in their drawings with masks. Some children expressed their feelings in tears, rainy days, signs, isolation, etc. Overall, the pandemic was a difficult period, which was reflected in the drawings as isolation, sadness, anger, sickness, etc. These results are similar to those of the study using the three-drawing method, where children drew more positive facial expressions before and after confinement, and where sadness was included during the period [23]. COVID-19 items were represented in 73% of drawings "during the COVID-19 pandemic". More than one item was represented in 28% of drawings. There was confusion in using COVID-19 items before the pandemic period in 2% of the drawings. In the majority of "during the COVID-19 pandemic" drawings, the elements of COVID-19 were represented by the child himself or other people wearing face masks. The physical distance was expressed in some drawings by 1.5 meters, and the coronavirus itself was expressed in rare drawings, by the sign or figure of the coronavirus. In a few drawings, we observed the representation of a hydroalcoholic gel. In almost all the drawings, the children represented other persons. In most of the drawings, the other persons appeared to be their friends or classmates. In some cases, the children represented their teachers. Parents were practically absent from the drawings. References to school, which were one of the instructions given for the three drawings, were mostly represented in the drawings. Representations of the school were more frequent in the drawings "before the COVID-19 pandemic", at 93% compared with 75% in the drawings "during the COVID-19 pandemic" and 82% in the drawings "after the COVID-19 pandemic". This may suggest that children felt more comfortable and secure with school before the pandemic.

The house was represented in 20% of "during the COVID-19 pandemic". However, almost no children drew their parents. One study suggested that the lack of representation of parents during the confinement was due to the incertitude and lack of adult control over the situation, which could lead children to represent their home as a place where they felt relatively safe [23]. The representation of wellbeing in the drawings varied. The wellbeing items were represented in 20% of drawings "during the COVID-19 pandemic" compared to 66% in drawings "before the COVID-19 pandemic" and 69% in drawings "after the COVID-19 pandemic". The COVID-19 pandemic was a period of confinement, of staying at home, of sickness, and of being away from people, which is reflected in the lower number of items listed under wellbeing. Some of the drawings depicted solitude, showing them alone in front of the window of their house, lying in bed, behind bars, etc. One child represented his school with its windows barricaded with nailed wooden planks in the drawing "during the COVID-19 pandemic".

One child remembered the precedent study we led in 2021 and represented us in the drawing. Another child represented a bin full of face masks, suggesting the waste problems caused by the pandemic. The same child drew a sign saying "war in Ukraine", suggesting new insecurity. Colors play an important role in the meaning of the drawings [34]. During the different drawing periods, the majority of children used colors, from 79% up to 82%. Monitoring changes in wellbeing over time is important, particularly for children. Most mental health problems in adulthood arise from difficulties encountered in childhood. School is an environment where children need to feel secure to develop their full potential. However, they can encounter difficulties during their school journey, such as learning difficulties, dropping out, and bullying by other children, which can affect their short- and long-term wellbeing. Wellbeing is not a static state and evolves as a function of the family situation, the child's environment, the child's entourage, as well as the child himself, which makes it even more important to monitor wellbeing over time.

Limitations

Our study had certain limitations. Wellbeing questionnaires

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were answered by 13% of children and 10% of staff. Some teachers expressed their feelings towards the direction of the school and explained they were tired of hearing about COVID-19. This can be interpreted as a wellbeing response in that they want to move out. The questionnaire was entirely completed by 98% of the participating children. To calculate the RCMAS scores, all the questions must be answered to calculate scores correctly. Factors other than COVID-19 are involved in the wellbeing evolution, such as the environment, the social environment, the family situation, etc. One school was more represented than the others in this sample. The drawings are subjective and can be difficult to interpret. Care must be taken when interpreting the drawings. The problem of inconsistent wellbeing in some drawings makes interpretation difficult. Some children drew elements linked to sadness (tears, sad faces, clouds, dark colors) and elements linked to happiness (butterflies, flowers, sun, etc.) in the same drawing. Oral explanations of the drawings by the children would have been interesting to add to the interpretations. However, 102 children took part in the drawings and adding this aspect to the organization of the study would have been complicated.

Conclusion

In conclusion, the COVID-19 pandemic has had a huge impact on children, both in terms of their wellbeing and their perception of the pandemic. Anxiety has increased, urging to limit further consequences later in life.

Abbreviations

COVID-19: Coronavirus disease

DYNAtracs: DYNAmic of TRAnsmission of Coronavirus in Schools

HAD: Hospital Anxiety and Depression scale

SES: Socioeconomic status

RCMAS: Revised Children's Manifest Anxiety Scale

SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

SD: Standard deviation

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Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Compliance with Ethics Guidelines

Study registration

The protocol, informed consent forms, and questionnaires were approved by the Hospital-Faculty Ethics Committee Saint-Luc ("Commission d'Ethique hospitalo -facultaire des Cliniques universitaires Saint-Luc") – UCLouvain, approval number: 2022/06DEC/469. It was registered on clinicaltrials.gov on 28/02/2023, identifier number: NCT05747638.

Conflict of interest

The authors declare that they have no conflict of interest.

References

1. World Health Organization (WHO). World mental health report: transforming mental health for all (2022): 296.
2. Santomauro DF, Mantilla Herrera AM, Shadid J, Zheng P, Ashbaugh C, Pigott DM, et al. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. The Lancet 398 (2021): 1700–1712
3. Duan L, Shao X, Wang Y, Huang Y, Miao J, Yang X, et al. An investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. Journal of Affective Disorders 275 (2020): 112–118.
4. Cooper K. Don't let children be the hidden victims of COVID-19 pandemic (2020).
5. Singh S, Roy D, Sinha K, Parveen S, Sharma G and Joshi G. Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. Psychiatry Research 293 (2020): 113429
6. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. The Lancet Child & Adolescent Health 4 (2020): 397–404.
7. Viner RM, Bonell C, Drake L, Jourdan D, Davies N, Baltag V, et al. Reopening schools during the COVID-19 pandemic: governments must balance the uncertainty and risks of reopening schools against the clear harms associated with prolonged closure. Archives of Disease in Childhood 106 (2021): 111–113
8. Rapport du Haut Conseil de la santé publique. Crise sanitaire de la Covid-19 et inégalités sociales de santé 144 (2021).

9. Golberstein E, Gonzales G and Meara E. How do economic downturns affect the mental health of children? Evidence from the National Health Interview Survey. Health Economics 28 (2019): 955–970

10. Piquero AR, Jennings WG, Jemison E, Kaukinen C and Knaul FM. Domestic violence during the COVID-19 pandemic - Evidence from a systematic review and meta-analysis. Journal of Criminal Justice 74 (2021): 101806.

11. Sprang G and Silman M. Posttraumatic Stress Disorder in Parents and Youth After Health-Related Disasters. Disaster Medicine and Public Health Preparedness 7 (2013): 105–110.

12. Loades ME, Chatburn E, Higson-Sweeney N, Reynolds S, Shafran R, Brigden A et al. Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. Journal of the American Academy of Child & Adolescent Psychiatry 59 (2020): 1218-1239.e3

13. Cremer K, Frère J, Chatzis O, Kabamba B, Renard F, Keukeleire MD et al. Children and Workers Well-Being in Belgian French-Speaking Primary Schools during the COVID-19 Pandemic. Health 15 (2023): 676–694

14. Sciensano COVID-19 Historical datasets. EPISTAT Infectious Diseases Data Explorations & Visualizations.

15. Fédération Wallonie-Bruxelles. Organisation de l'enseignement maternel et primaire ordinaire pour l'année scolaire 2022-2023 (2022).

16. Fédération Wallonie-Bruxelles Indice socioéconomique des implantations, établissements et secteurs statistiques. Enseignement (2022).

17. Cremer K, Frère J, Chatzis O, Mendonca RD, Kabamba B, Renard F, et al. SARS-CoV-2 Antibody Seroprevalence in Children and Workers from Belgian French-Speaking Primary Schools. Health 15 (2023): 917–937.

18. Frère J, Chatzis O, Cremer K, Merckx J, De Keukeleire M, Renard F, et al. SARS-CoV-2 Transmission in Belgian French-Speaking Primary Schools: An Epidemiological Pilot Study. Viruses 14 (2022): 2199

19. Bouvard M. Échelles et questionnaires d'évaluation chez l'enfant et l'adolescent., Elsevier Masson (2008): 192.

20. Reynolds CR and Richmond BO. Factor Structure and Construct Validity of the Revised. Annual Meeting of the American Psychological Association 10 (1978).

21. Zigmond AS and Snaith RP. Hospital Anxiety and Depression scale. Acta Psychiatrica Scandinavica 67 (1983): 361–370.

22. Crocq L, Hariki S, Gandelet JP, Lançon JM and Passamr M. Se reconstruire après le séisme: Le Test des trois dessins "avant", "pendant" et "avenir." 5 (2005): 17–23

23. Cornaggia A, Bianco F, Gilli G, Marchetti A, Massaro D and Castelli I. Children's representations of the COVID-19 lockdown and pandemic through drawings. Front Psychol 13 (2022): 960893

24. Institute of health Metrics and Evaluation. Global Health Data Exchange (GHDx).

25. Institute for Health Metrics and Evaluation (IHME) Mental health. Institute For Health Metrics and Evaluation.

26. Recover Getting Ready to Talk about Long COVID with Your Child's Doctor.

27. Hampshire A, Azor A, Atchison C, Trender W, Hellyer PJ, Giunchiglia V, et al. Cognition and Memory after Covid-19 in a Large Community Sample. N Engl J Med 390 (2024): 806–818.

28. Al-Aly Z and Rosen CJ. Long Covid and Impaired Cognition — More Evidence and More Work to Do. N Engl J Med 390 (2024): 858–860

29. World Health Organization (WHO). Green and blue spaces and mental health: new evidence and perspectives for action (2021).

30. Bratman GN, Hamilton JP and Daily GC. The impacts of nature experience on human cognitive function and mental health. Annals of the New York Academy of Sciences 1249 (2012): 118–136.

31. Dzhambov AM, Markevych I, Hartig T, Tilov B, Arabadzhiev Z, Stoyanov D, et al. Multiple pathways link urban green- and bluespace to mental health in young adults. Environmental Research 166 (2018): 223–233

32. Bratman GN, Anderson CB, Berman MG, Cochran B, De Vries S, Flanders J et al. Nature and mental health: An ecosystem service perspective. Sci Adv 5 (2019): eaax0903.

33. Labib SM, Lindley S and Huck JJ. Spatial dimensions of the influence of urban green-blue spaces on human health: A systematic review. Environmental Research 180 (2020): 108869

34. Farokhi M and Hashemi M. The Analysis of Children's Drawings: Social, Emotional, Physical and Psychological aspects. Procedia - Social and Behavioral Sciences 30 (2011): 2219–2224.