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Forecasting the Long-Term Effects of the Pandemic on Children: Towards a COVID-Generation

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Abstract

This study focuses on mapping the existing effects of the pandemic and the measures taken to address it on the mental health of children in order to investigate the long-term consequences that it is expected to have. For infants, preschool, school and adolescent children it seems that intense stress develops for different reasons. As adults these children may experience an increased incidence of anxiety, depressive, obsessive–compulsive and personality disorders, while they are also expected to develop a strong External Locus of Control, low Faith in the Just World and low happiness. At the same time, an absence of distinction within the limits of the physical and digital world is expected. As for children with special educational needs, they are particularly affected due to the pandemic, as early diagnosis and the development of interventions to improve their educational and psychosocial progress are hampered and this might have negative long-term effects on their development. In overall, these negative effects and related experiences seem to be homogeneous across humanity for those who are currently minors and are expected to lead to the view of an autonomous generation, the COVID-generation.

Keywords: children, generation, mental health, pandemic, stress

1. Introduction

The theory of the critical period is based on the assumption that there is a certain time period for the development of specific skills, which can not be sufficiently and fully developed after this period [1, 2].

In the development of the theory of the critical period two factors may be considered to have contributed catalytic. The first factor was the finding that certain biological capacities, such as conception and pregnancy, are available only at certain periods of time, and that then must be utilized within that time period. Consequently, there may be a related period for the non-biological parameters of development as well [1]. Another factor that contributed to the development of the theory of the critical period is the observations of a few incidents of people who for some reason were cut off from human civilization. The wild boy of Avignon who was found living in the forests and never developed its language skills to effectively communicate with the others despite related interventions applied to him is possible the most widely known related case [3]. In modern times, children deprived from sufficient exposure to others communications and language stimuli due to living in orphanages have also been studied as for the negative effects of missing the critical period [4].

As Scovel [2] reports, the theory of the critical period is based on the plasticity of the human brain. As he points out, during the period of puberty, a reduction in the synapses of the brain takes place, thereby leading to less plasticity. For this reason, he considers that the development of language and communication skills should take place as early as possible, since the greater plasticity of the brain is essential to sufficiently develop communication skills impossible to be developed later on in life.

Although it was initially thought that the critical period is the whole period before adolescence, it was soon found that this is not absolute and that there are many different stages of the period until puberty, thus appearing that there is no “one” critical period [2]. Despite such further skepticism on the specific sub-stages of critical period, it is widely accepted that it has a profound influence on human lifespan [2, 3]. Based on the above, the role of the environment is to provide the necessary conditions for cognitive and linguistic development during the critical period. Thus, the abundance of information and opportunities for children leads to positive effects on the development of children, while the limitation of opportunities to negative effects, due to the non-utilization of the critical period [3].

From a methodological point of view, the effects of the critical period have been studied, as mentioned above, in two different ways, namely first with case studies and then with studies focusing on specific populations that had been cut off from the environmental stimuli necessary for the development of children. In any case, although these studies have led to a sufficient amount of knowledge, the case of a milder but massive deprivation of environmental stimuli in the wider population of children, that is to say, the children of a society as a whole, has not yet been studied. The COVID-19 pandemic undoubtedly provides the opportunity to explore the theory of the critical period at a mass social level, something that will have to be studied by scientists and researchers of the future. However, social scientists not only have to explain, but also to predict related phenomena [5]. In this context, it is imperative to investigate the potential effects of mass deprivation of environmental stimuli due to measures to limit the spread of SARS-CoV-2 on children’s development. This review summarizes the possible effects on typical and non-typical children, by investigating specifically students with ADHD and autism, and leads to the suggestion of a COVID-generation for children and adolescents significantly affected by the pandemic.

2. Main text

2.1 The effect on students with typical development

2.1.1 The effect on infants

Elevated stress levels of the mother during the prenatal period, as well as child stress at the stage of infancy, childhood and adolescence entails pronounced negative effects. The human body is particularly vulnerable to stress at these developmental stages, with chronic stress resulting in a multitude of negative effects on mental and physical health throughout life [6]. The first related effect already concerns the perinatal age and the stress to which the mother is subjected. Particularly illuminating is a relative position of Bogin and Varea [7] on the possible effects of severe stress on mothers in the period of gestation due to the pandemic. As they state, intense maternal stress is probably associated with the birth of children with lower body weight, which is a predisposing factor for low school performance, increased incidence of mental health problems and a plethora of physical disorders

throughout life. Thus, based on the model, the severe stress of the pandemic may have a significant negative effect on the development of children born during that period due to the stress experienced by the mother during pregnancy and their birth with a lower body weight than would be expected. These effects are estimated to entail long-term negative consequences for infants born during the pandemic.

In the period of infancy, the mother's interactions with the infant are crucial because of its emotional, linguistic and cognitive development [3]. However, these interactions may be significantly restricted during the pandemic. During the pandemic, an important issue was the transmission of the virus from the mother to the infant. Public health policies were even focusing on to separate the mother from the infant in cases where there was an increased risk of transmission of the virus [8, 9]. This is clearly contrary to the necessity of increased interactions between the mother and the child during infancy, thus ignoring the benefits of breastfeeding not only for the physical, but also for the early psychosocial development of the infant [8]. It is even argued that in all cases the benefits of continuing breastfeeding outweigh the risks and that a policy of zero separation of the mother from the infant should be implemented [8]. Therefore, in infancy, the separation of the mother from the infant seeking to limit the risk of transmission of the virus to it may entail a multitude of negative effects for its subsequent linguistic, psychosocial and cognitive development. Indeed, it is possible that these consequences are even more pronounced for infants of mothers who, due to their professional status, have an increased risk of contracting the virus and may develop further distance from the infant in order to protect it, such as nurses, security workers, public transport workers, cleaners, etc.

Finally, it is of most importance for infants to observe the facial expressions of the others, as this fosters their emotional development and interaction skills [3]. Since massive face mask use is mandatory during the pandemic, the limited interactions of children with the mother and other significant people without wearing masks might lead to emotional and communicative deficits.

2.1.2 The effect on preschool children

Facial expressions are also important for preschool emotional and social development [3]. Thus, the related negative effects of massive face mask use could also apply to preschool children.

Apart from the aforementioned effects, in recent decades, the disengagement from the Piagetian theory on children's cognitive development has led to a review as to whether they can actually perceive complex and complex issues that in the past were thought to be impossible to perceive [3]. Therefore, the main question in this case concerns whether preschoolers can actually perceive the threat of the pandemic and develop stress for this reason. This question can be considered to have been answered as early as the early phase of the pandemic, where a sample of 320 children and adolescents aged 3 to 18 years was examined in China. As found in this study, children aged 3 to 6 years old were significantly more likely than older children to fear that some of their family members will be infected with the virus. Therefore, in this case not only preschoolers perceive the risk of contracting their loved ones with the virus, but also develop a strong fear because of it [10].

Another key effect may be fear about the family's deteriorating financial situation. As insecurity, uncertainty and unemployment increase due to the current pandemic, it is likely that preschoolers are experiencing severe stress, perceiving the broader situation and climate of the family they live in [11].

Another important reason why in families there may be increased stress in this period and adversely affect the development of children is the loss of work and

family life balance on the part of the parents. Particularly illuminating is a relevant study of 254 families in Canada, which found that there was a significant effect on family stress due to the inability to find a balance on the part of parents between family and working life [12]. It could therefore be seen how the perception of family stress and the imbalance of family and work life of parents on the part of preschool children also leads to intense stress on their part.

Based on the above, it appears that the factors that affect the development of stress during preschool age due to the pandemic are multidimensional and do not concern exclusively the fear of contracting the virus.

2.1.3 The effect on school children

At school age, there is a significant increase in children's stress due to the sharp change in their previous routine. Indeed, unlike preschoolers, school-age children may have been accustomed for many years to go to school and interact in the natural environment with others. As most activities now take place within the home, this also leads to increased stress levels for school-age children. In fact, these levels are higher for boys, children who have separated parents and children whose parents have psychiatric illnesses [13].

Tele-education was considered as a must-use solution during the pandemic. Yet, this transition is considered as a source of significant stress for students [14]. Although so far there have been no relevant research comparing stress levels before and during tele-education, it could be considered that this is associated with greater stress for students due to the limitation of interpersonal interactions with their peers, the need to adapt to a new and quite difficult reality for them and the technical barriers and difficulties of responding to the project of tele-education. Such problems might be even more intense for students belonging to minority groups, which might face more difficulties and barriers [15].

Another reason why the pandemic leads to increased stress for children is prolonged screen use, irrespective of the needs of tele-education. Particularly enlightening about this phenomenon are Imran, Zeshan, & Pervaiz [16]. As they state, the prolonged contact of children with screens is a basic problem that is generally observed after important socio-political events. As they note, something similar was observed after the attack on the Twin Towers, where the children had a fairly prolonged contact with the screens. As they support, this may lead to increased levels of stress, as prolonged contact with the screens of electronic devices leads to intense stress. Indeed, this may be attributed to the disturbance of the circadian rhythm due to prolonged contact with the screens, which leads to intense stress [17].

Finally, another reason why the pandemic may lead to increased stress for children concerns the strong stigma that the virus infection may entail for them [16]. In addition, children might experience severe stress due to cyberbullying, which has significantly increased during the pandemic [18].

2.1.4 The effect on adolescents

During adolescence, various studies lead to the finding that experience high levels of stress due to the pandemic. For example, in a relevant study in Italy between April 1 and 5, 2020, a sample of 5,295 adolescents was studied in terms of their stress levels. As found by this study, 28.9% of adolescents had moderate or high levels of stress, a percentage that should be considered as quite high [19].

Apart from a general reference to stress at this period, it is imperative to understand what a teenager is called upon to do during that stage. In order to cope with stress and develop psychosocially a teenager is required, according to Erikson's

theory, to develop his identity and cope with the problem of role confusion. Erikson considered that adolescence is an identity crisis, in which the teenager is called upon to respond against a hostile world until then. To achieve this it must have the best possible support from the systems and environments to which it belongs. As there is therefore a wider hostile social environment in which adolescents cannot interact, experiment and develop their identity, they are expected to experience high levels of stress, but also a risk of not being able to achieve this developmental conquest [3].

Negative effects on the mental health of adolescents due to severe stress are already reported. In a relevant study on a sample of 1,054 adolescents in Canada stress and depressive symptomatology during the pandemic were studied. As the results of the analysis indicates, there was a positive and statistically significant correlation between stress and depressive symptomatology [20].

2.1.5 Erikson's theory in the COVID-19 era

More broadly, Erikson's theory may provide an explanatory framework on how stress-related problems develop in adulthood, possibly illustrating developmental conquests that are not achieved and helping to predict the subsequent negative effects of the pandemic on mental health. **Table 1** presents the main pillars of Erikson's theory and explains why the pandemic hinders the achievement of the relevant developmental conquests [21].

Based on the following, it can be assumed that at each developmental stage, as described this year, the conditions and dynamics of the pandemic do not help children in the necessary developmental conquests. In the period of infancy the distance between mother and child undoubtedly leads to problems in psychosocial development. As the child wonders whether he can trust the world, it is initially necessary to develop on the part of the mother a climate of trust towards the child, which is carried out to a considerable extent through breastfeeding. As breastfeeding is hampered in order to limit the possibility of contracting the virus, this may result in the impossibility of achieving the developmental conquests of this stage.

In the period of two to three years of age, the child is called upon to develop his autonomy and overcome doubt and shame. This is realized through relationships with parents. The parent, however, has not only a causal effect on psychosocial development at this stage, but also an indirect effect that involves providing the necessary framework to the child in order for it to develop adequately. This, in normal conditions, takes place through the motivation of the child to team play and enrollment in nurseries. However, as this does not take place in a normal way during the pandemic, infants may not be able to develop their autonomy at this developmental stage.

At the age of three to six years, the family has a particularly decisive role in the psychosocial development of the child. However, as mentioned above, children at this developmental stage may not be able during the pandemic to perceive the intense stress of the family. This stress may be associated with the fear of contracting the virus, but also with other threats of the pandemic period, such as the change in the family's economic dynamics. This clearly also leads to the impossibility of healthy psychosocial development at this stage. In addition, at this developmental stage, children may develop limited interaction with others and not develop team play to the extent to which they should. During middle and late childhood, Erikson considered the neighborhood and the school environment to be central to the development of children. In fact, based on this theory, sport has a catalytic role in the psychosocial development of the child. Limited group sports activities and generally limited contacts and interactions at this age and developmental stage, especially in the age of tele-education, clearly imply inability of children to develop psychosocially.

Age	Virtues	Psychosocial crisis	Significant relationship	Existential question	Events	Potential problems caused by the pandemic
Infancy under 2 years	Hope	Trust vs. mistrust	Mother	Can I trust the world?	Breastfeeding, abandonment	Distancing between mother and infant to reduce risk of infection, face masks
Toddlerhood 2–3 years	Will	Autonomy vs. shame/ doubt	Parents	Is it ok to be me?	Toilet training, clothing themselves	Reduced nursery attendance, low social interactions, lack of group play, face masks
Early childhood 3–6 years	Purpose	Initiative vs. guilt	Family	Is it ok for me to do, move, and act?	Exploring, using tools or creating art	Stressful family environment, fear of infection, low social interactions, lack of group play
Middle & latter childhood 7–12 years	Competence	Industry vs. inferiority	Neighbors, School	Can I make it in the world of people and things?	Sports and school	Reduced sports participation, underdeveloped social skills due to tele-education
Adolescence 13–19 years	Fidelity	Identity vs. role confusion	Peers, Role model	Who am I? Who can I be?	Social interactions and relationships	Low autonomy, external locus of control, inability to develop identity

Table 1.
The developmental stages of Erikson in the era of COVID-19.

At the stage of puberty, adolescents may not be able to develop their role identity in a healthy way, as Erikson felt it was imperative to do. Due to the pandemic, it can be considered that it strengthens the view of adolescents, but also people in general that the control of things is not in their hands. This may not, of course, have such strong negative effects for adults. However, in the period of puberty it is possible that the identity of adolescents is not sufficiently developed, as they realize that they can not influence the external reality to the extent that they would like.

2.1.6 Long-term effects on typically developing students

Based on a systematic review of the literature that summarized knowledge from previous crises of transmitted diseases, such as H1N1 and Ebola, high stress levels are experienced by children during these periods. It appears that these crises, as well as the COVID-19 crisis, may lead to an increased risk for anxiety disorders, post-traumatic stress disorder, depression and acute stress disorder. This is therefore an aggravating effect on a wide range of different mental illnesses [22].

Based on the above, it can be assumed that the negative effects found in the period of infancy, preschool, childhood and adolescence will also have corresponding negative effects in the psychopathology of adulthood. It may be quite difficult to establish this, and to date it should be regarded as a hypothesis to be investigated. However, it is quite possible that an increase in psychiatric morbidity in the cohort of children and adolescents of the pandemic should be expected, even if it is unclear which disorders will be concerned and to what extent it will be carried out.

A first category of disorders that may increase over the coming decades is that of anxiety and depressive disorders. Childhood stress often leads to severe problems in the later developmental stages [23]. Specifically in the case of the current pandemic, this may be attributed to an increased vulnerability of children to stress during. Therefore, children become particularly vulnerable to stress and cannot develop the relevant resilience mechanisms as adults, they are expected to be particularly vulnerable against the development of depressive and anxiety disorders. The development of obsessive-compulsive disorders is also possible, since frequent hand washing might contribute to the onset of these disorders [24].

A second category of disorders that may increase in the coming decades concerns personality disorders. Early experiences have a decisive role in the development of these disorders in adulthood, and the acquisition of healthy and adaptive mechanisms of regulation of emotions in childhood is a factor predisposing children to the development of non-pathological forms of personality in adulthood [25]. In a world of limited interactions where children cannot trust others because they do not come into physical contact with them to prevent infection, it is quite possible to observe a frequency in disorders such as schizotypal personality disorder, since it develops due to the unhealthy development of social interaction skills in juvenile life [26].

The negative effects of the pandemic on adulthood may not only be related to the existence of mental illnesses, but also to the inability to develop positive traits that help humans cope with challenges. Internal Locus of Control is considered highly adaptive, as it is associated with goal setting, feeling of happiness and creativity [27, 28]. As a pandemic therefore entails a loss of the sense that one controls his/her external environment, there may be a shift in the next generation from the internal to the external locus. Moreover, the formation of locus of control can be considered to be influenced by the fact that the very development of identity during adolescence is significantly affected by the pandemic [29]. If, therefore, Locus of Control constitutes a characteristic inherent to the person's identity, then the change of this during the pandemic towards the external locus will lead to adults being

less happy and less creative. Even a further negative impact on mental health is not excluded due to the development of an external locus, as already since the period of the pandemic it is claimed that mental health is worse for those who score higher in External Locus of Control [30]. To sum up, the shift from the internal to the external locus may take place due to the pandemic and lead to negative effects on mental health, not necessarily related to the existence of specific disorders.

Another negative impact on the mental well-being of today's children and adolescents when they become adults may be the consideration of whether the world in which we live is fair. Faith in the Just World constitutes a functional and adaptive response of the individual to his/her external environment, as the child sets goals considering that those who adhere to them and work systematically to achieve them actually achieve them. As therefore the individual feels that he will be rewarded, he/she tries accordingly [31, 32]. At the time of the pandemic it can be considered that people might stop believing in the Just World. Indeed, the basic principle of the Just World Theory is that those who have poor health are themselves to blame for what happens to them and therefore it can be assumed that they themselves contributed to the situation in which they are, creating the expectation that if an individual behaves in a different way he/she will have good health [31]. But it can be seen that the pandemic itself as a fact leads to the view that even those who are not responsible become infected, thus leading to a review as to whether the world in which we live is fair. As adolescents, but also children, seem to be able to perceive issues related to morality and justice [3], it is possible that the generation of people who live as children and adolescents in this pandemic may think that the world we live in is not fair.

Another potential threat concerns the shift to individualism. Regardless of the pandemic, it has been investigated whether the major crises a community is dealing with lead to an increased collective feeling or, on the contrary, promote individualism. This may, however, be related to pre-existing social structures and relationships of the societies being studied. For example, in Greece during the debt crisis era, it was found that, paradoxically, the psychopathological manifestations of the vulnerable, in particular patients with chronic diseases, were lower during the acute phase of the crisis compared to its other periods, which can be attributed to the increase of social support to these individuals during the economic crisis [33]. It is doubtful, however, whether this can be observed in societies which do not have such strong collective identities. Indeed, Greece is a typical case of a country where there are still strong collective identities and low individualism [34]. However, it is doubtful whether similar trends are followed in societies that may not be formed on the basis of strong collective identities. In this case, perhaps especially during the period of adolescence, where the development of meaningful relationships with others should be enhanced, this should not take place and a strong individualism might be developed. In this way, more individualistic societies could occur, with less strong links between individuals. Indeed, the development of interactions and social links with the use of the internet is doubtful whether it can lead to close relationships between adolescents and subsequently between adults. It is therefore possible for the generation of people who experience the pandemic as children and those who are teenagers to become more individualistic as adults.

Finally, there may be a lower IQ for the general population in the future than the IQ observed today. Early experiences have a central and highly formative role in the development of human intelligence [3, 25]. Based on the theory of the critical period, this presupposes the existence of these experiences at the appropriate developmental and evolutionary stage [3]. The pandemic is a situation in which it could be assumed that humanity has literally been dormant for more than a year. Clearly, this does not mean that when the pandemic is over there will be the

possibility of exploiting the critical period of development for those students who were deprived of the necessary environmental stimuli during the pandemic period. It is therefore expected that not only will their social and communication skills be reduced, but also their overall IQ, as they will be deprived of the necessary stimuli required for its development. It is therefore a generation which, by depriving itself of the necessary environmental stimuli, will be affected by the phenomenon which Itard first described in his study of the boy of Avignon. Even if it can be considered an exaggeration that there will be similar effects, which certainly will not be the case, the negative effects of the pandemic on mental health and the overall development of children are based precisely on this mechanism described thanks to Itard's observations.

2.2 The effect on non-typical students

2.2.1 The effect on students with ADHD

As confirmed cases of Covid-19 began to rise globally in March 2020, there was a corresponding decline in appointments to health services. In many countries pediatric outpatient departments were closed and the majority of doctors stopped seeing patients in person. Children's mental health services necessarily began to be provided by phone support or via video. Initially, it was very difficult to provide adequate support for children with ADHD through these services as there was no relevant preparation and experience [35]. The publication of guidelines for the evaluation and management of ADHD during the Covid-19 pandemic by the European ADHD Guidelines Group (EAGG) [36] and also by the Canadian ADHD Resource Alliance [37] was useful for adapting to the conditions of remote provision of mental health services to students with ADHD, although until health professionals familiarize themselves with the relevant services, valuable time was lost [35]. Globally, in the first weeks after the restrictions implemented due to Covid-19, new patient evaluations were carried out by phone, as there were no video conferencing facilities available. As it was not possible to carry out adequate observation of the children, it was not possible to complete these assessments and therefore diagnosis and interventions were delayed. So internationally all new assessments of children who may have had ADHD were temporarily postponed [35]. Based on the guidelines of EAGG [36] all procedures for providing mental health services to children with ADHD, including initial assessments, should continue throughout the pandemic, but should be carried out remotely, using a phone or video conference. Videoconferencing facilities were however not available during the first stage of the pandemic, leading to a significant delay in the new evaluations, although the related problem appeared to be addressed during the second wave of the pandemic [35].

Also significant were the problems with the lack of feedback on the change in symptomatology. The closure of schools led to significant difficulties for the assessment process of students with ADHD. Quantitative scoring scales are usually administered prior to the start of pharmacotherapeutic treatment of students with ADHD and are re-administered at regular intervals to control the change in the symptomatology of students and to re-evaluate the appropriateness of existing treatments. Most of these assessments include, due to the content of the relevant scales, items related to behavior and adaptation in the school environment. Thus, the closure of schools created significant problems in the reassessment of the symptomatology of students with ADHD [35].

Another major problem concerns delays in starting medication. Before the outbreak of Covid-19, newly diagnosed students with ADHD were waiting to start medication. Based on international standards, the protocol for pre-medication

preparation includes scales of the basic score of the severity of ADHD, scales of evaluation of possible drug side effects, cardiovascular control and physical cardiovascular examination, carried out by General Practitioners. As the outbreak of the Covid-19 pandemic led to a need for physical detachment, the ability to complete the relevant medical checks carried out prior to initiation and administration of medication was also limited. Therefore, for those who did not have adequate cardiological assessment by that time, the start of medication was delayed [35].

Subsequently, the EAGG developed relevant guidelines to circumvent the need for such controls. The bypass of cardiological checks was considered possible when three individual conditions were met. First, there should be no family history of early (<40 years) sudden cardiac death in a first-degree relative. Secondly, the possibility of home monitoring of heart rate and blood pressure, for example by parents. Third, to be able to administer and supplement specific and age-adjusted cardiovascular risk scales [38]. If possible, initial monitoring was considered useful to be carried out by remote assistance and monitoring of the physician [36]. Overall, based on these guidelines, it was up to the clinician to weigh the risks and make the necessary decisions for the therapeutic support of students with ADHD [38].

Contrary to this trend, The Canadian ADHD Resource Alliance [37] differed from EAGG's view of the possibility of remote evaluation during the pandemic. Thus, the Canadian ADHD Resource Alliance considered that physical examination by the general practitioner should be carried out using appropriate personal protective equipment prior to initiation of medication. In addition, it was suggested that that clinicians could examine whether there is a history of recent (<6 months) physical examination, including blood pressure, heart rate, weight and height, and rely on this pre-administration of medication [37].

Another negative effect of the pandemic is that requests for new diagnoses of ADHD have been reduced. For example, McGrath [35] reports an 80% reduction in applications for new diagnoses in Ireland. This trend should not be considered to be specific to students with ADHD, as it appears to be a broader trend towards a decrease in visits related to the diagnosis of specific learning and developmental disorders during the pandemic [39]. In any case, delay in diagnosis may lead to a worsening of the symptomatology for these students and a loss of an early period where relevant interventions could be applied to treat ADHD symptomatology [35].

Another relevant support need for students with ADHD during the pandemic concerns participation in distance learning. In a related survey conducted between April and June 2020 in the United States, a sample of 134 year-old adolescents was examined as to the difficulties they faced during the pandemic. As found by this survey, 20.3% of participants reported it as particularly difficult to participate in distance education [40]. Another survey in Israel studied a sample of 529 typical students and 119 students with ADHD during the pandemic. This survey compared the perceptions of these two groups on distance learning. As the results analysis found, the valuation of students with ADHD was significantly worse for the distance learning project compared to typical students [41]. Similarly, a survey of parents of students with ADHD in Canada found that 41% of a sample of 587 parents stated that their child was unable to successfully meet the needs of tele-education, a figure that should be considered particularly high [42]. Therefore, it seems that independent research leads to the identification of significant obstacles to the participation of students with ADHD in the project of distance learning during the pandemic. A noisy environment and a room in which there are enough stimuli to attract the student's attention could explain the inability of ADHD students to adapt in tele-education [35].

Based on the above, it appears that especially during the early phase of the pandemic there were significant problems in the diagnosis and support of students with ADHD. In any case, early diagnosis and intervention entails significant benefits for students with ADHD and is considered important because it does not focus on the very consequences of ADHD on the development path of students, but on the etio-pathogenetic mechanisms themselves, thus leading to particularly beneficial effects for children and a long-term improvement of its developmental path thanks to early intervention [43]. Thus, it is possible that several students with ADHD missed or are missing this critical period for related interventions due to the measures taken to slow the spread of the pandemic and that they might experience negative long-term effects in the future in their psychosocial, academic and overall development.

2.2.2 The effect on students with autism

Several studies have been carried out to investigate the experience of students with autism during the COVID-19 era. In a related study in the Philippines, five parents of children with autism were interviewed about the perceived effects of the pandemic on the teaching and development of their children. This study found that it was particularly difficult for children with autism to adapt to training conditions from home and more generally to a new routine model due to the restrictions imposed. In addition, parents in the survey were significantly concerned that home education leads to significant limitations in the social interactions of children with autism, thus impeding their progress [44]. For children with autism, family routines may be a way to structure and enable participation, with consistency in routines employed by families helping them to adapt, participate, and know what to expect [45]. Therefore, the disruption of routine for students with autism due to pandemic response measures may have negative effects on their developmental course.

In overall, it can be assumed that changes imposed due to the pandemic and measures to limit the spread of SARS-CoV-2 led to significant stress for children with autism, as there was a rapid and significant change in their daily lives [46]. Children with autism are more susceptible to stress compared to typical children [47]. The negative effects of prolonged stress exposure due to the pandemic are yet unknown, but it could be supported that these children might develop specific phobia and social anxiety, since they are quite prone to these stress-related disorders [48, 49].

Another important issue has to do with the use of masks. In general, children with autism have a significant phobia about medical procedures, which also applies to the use of a protective mask, as they have a reduced tolerance to the use of it by themselves, but also by others [50]. In addition to investigating what this may entail for the risk of spreading the virus or the reasons why children with autism resist the use of masks, it is necessary to investigate the negative effects that the use of masks may entail on the development of children with autism. In students with autism there is an insufficient ability to recognize emotions, which is attributed to a significant degree that they are unable to perceive and interpret facial expressions [51, 52]. As children with autism have a wider difficulty in recognizing each other's emotions, interventions towards them focus significantly on enhancing how children with autism recognize the expression of emotions on the face of others, which is considered an important developmental achievement [53, 54]. As the use of masks therefore prevents the already difficult, but also necessary for children with autism, recognition of facial emotions, it is possible that the mass use of masks by the general population also leads to negative effects on their emotional understanding of children with autism.

Another particularly important problem concerns the gaps in therapeutic interventions to address the disorder. Particularly illuminating is a relevant case study in Indonesia, where a boy with autism aged 3 years and 2 months was examined. The intervention to this student was discontinued due to the dynamics of the pandemic and subsequently it was investigated whether this led to negative effects on the course of therapeutic intervention. As it was found, just one and a half months of interruption was enough for the previous treatment conquests to have been lost [55]. Attempts to implement online interventions have been carried out [56], although it is doubtful if such interventions can have an equal impact with face-to-face interventions, especially in autism, where interventions based on technology are integrated to a child's physical environment. For example, interventions with the assistance of robots developed for children with autism aim to enhance the child with autism to interact not only with the robot, but also with parents and other children being at the same environment while playing with the robot [57]. In general, the integration of interventions based on modern technology in the physical environment and the need for close contact between the therapist and the child debars internet-delivered interventions for children with autism during the pandemic, leading to uncovered supportive care needs. Since omissions in early and effective interventions are related to long-term under-development of communicative and social skills for children with autism [58], it could be supported that this is a serious hazard of the COVID-19 pandemic regarding their development.

In overall, the COVID-19 pandemic lead to important strains for children with autism due to distance learning and need for home-based activities and interactions. The use of face masks might also be an important parameters for this group of students, further obstructing their ability to recognize facial expressions and emotions. Barriers in treatment and early intervention might also be of most importance and lead to irreversible long-term negative consequences.

2.3 Studying an independent generation?

The number of these negative effects must certainly lead to the following question: Does the significantly different experiences of today's children and today's adolescents lead to a completely different generation? Each cohort of people who have been exposed to common high-impact stimuli can be considered as belonging to an autonomous generation [59]. In recent decades, it can even be assumed that common technological development around the world and globalization are leading to the possibility of considering the existence of common generations across humanity. For example, while the so-called Greatest Generation concerns those who belonged to countries that fought in the Second World War and were born between 1901 and 1927 [60], younger generations such as Millennials [61] are certainly studied almost globally, as the common stimuli also lead to the consideration of a common generation of people across humanity. It can therefore be assumed that the significant power of stimuli modulators for those who are currently minors will also lead to the consideration of an autonomous generation of people, namely a COVID-generation. This generation must clearly be defined in terms of the years of birth of those who can join it and their central characteristics. These two parameters, however, are not unrelated to each other, as it is expected that the degree of intensity of the effects should be reflected, in order to categorize within this generation only those who have actually been affected to a very significant degree by the current pandemic. For example, future research may lead to the finding that those born during the pandemic have no significant differences in their subsequent development due to this experience, which may be attributed to the plasticity of the human brain early in life, which allows recovery after experiencing unpleasant experiences [3]. It is therefore necessary to delineate

those age groups in which there are such strong effects, so that the conclusion can be drawn about an autonomous generation of people. In any case, as elements of this generation and as central studied parameters can be considered the following:

1. The increased frequency of anxiety and depressive disorders: vulnerability to stress will lead to an increased likelihood of developing anxiety and depressive disorders for individuals of this generation.
2. An increased frequency of personality disorders: the deprivation of necessary interpersonal interactions during childhood and adolescence will predictably lead to an increased frequency of personality disorders for these people.
3. Absence of distinction between the physical and the digital world: this generation is expected to see an absence of distinction between the physical and the digital world. This will certainly concern the environment of education and work. However, this may also extend to the conclusion of friendly and romantic relationships.
4. A powerful external locus of control center: individuals of this generation will feel that the control of their lives is in the hands of “experts” and fate.
5. Low Belief in the Just World: individuals of this generation will be expected to think that the world is in general unjust, with whatever this may entail for setting goals and adhering to them.
6. Limited interpersonal interactions and social ties: people of this generation are expected to enjoy fewer and not so close social relationships with the rest.
7. Incomplete communication and social skills, as well as a lower IQ: the loss of the critical period will lead to significant relative deficits.
8. Increased interest in environmental issues: it is expected that addressing this crisis will lead to an increased desire to prevent the development of related crises in the future. As the environmental issue is one of the most important problems for humanity in the decades to come, it is estimated that individuals of this generation will develop increased environmental sensitivities in order to avoid such a crisis.
9. Reduced trust in local governments and increased loyalty to international organizations: during the pandemic it became clear that the management of the crisis goes beyond the narrow limits of nation-states. A significant role in the management of the pandemic was played by the non-profit organizations that financed the development of vaccines and the World Health Organization. It is therefore estimated that this generation of people will be distinguished by increased confidence in international institutions and low confidence in local governments and local organizations.
10. Continued need to provide supportive services to people with specific learning and developmental disorders: as described above, the pandemic leads to a delayed diagnosis for people with specific learning and developmental disorders and to a lower quality of supportive services. This will clearly lead to deficits which will require overstretched interventions to be filled in the future. People with special learning and developmental disorders that will be part of this generally expected will need continuous interventions.

3. Conclusions

The current pandemic raises important ethical issues, which were expected to concern the people of post-industrial societies. In the information age, important ethical questions emerged by studying the dipole between compulsion and consent to important collective and societal issues, seeking a balance between social functionalism and individualism [62]. As we move from post-industrial societies to the Fourth Industrial Revolution, the former as well as additional ethical issues are expected to concern humanity [63], with the way the current pandemic is managed certainly reflecting some of them.

Irrespective of the COVID-19 pandemic, each generation of people must be assessed by the next as to whether their own well-being has been sacrificed to protect the well-being of subsequent generations. In an opposite view, for example, it could be assumed that the soldiers of the Second World War did not have to fight, as they would risk losing their lives and should prefer living in a Nazi occupied world. Of the 300 Spartans of Leonidas until today, humanity always evaluates the previous generation of people based on what contributed to the welfare of the next generation. Therefore, the evaluation of response policies against the pandemic must be carried out not only on the basis of today's conditions, but also by predicting the effects that the way it is managed will have on the next generation of people. Even in a scenario where pandemic response policies would be completely effective and lead to zero deaths, this could be considered unacceptable in the event that individual freedom, mental health and economic well-being would be disproportionately affected. Consequently, the development of relevant pandemic response policies by governments and international organizations seems to have disproportionately combined the need to protect public health with the protection of individual freedom, mental health and economic well-being, although the latter is not the subject of this chapter. The balance between all this is clearly a difficult equation. It is not, however, a failure of health policy makers to solve this equation, but a total disregard for the parameters that should be taken into account.

Reverting to the ancient Greek view of things, various philosophers, perhaps most notably Socrates, highlighted not only the dimension of physical well-being, but also mental, considering as a state of imbalance to give further weight than that which should be given to one of these two pillars of human health. It can therefore be considered that the excessive emphasis placed on the protection of physical health through measures such as the universal use of mask, delays in special education diagnosis and interventions, the wide application tele-education for very long periods and the restrictions in sport activities of children are disproportionately as to the good he had to protect, as they pose the risk of very significant threats to the mental welfare of children, bearing not only today, but also tomorrow.

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