



Emotional and Behavioral Impact of the COVID-19 Epidemic in Adolescents

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Abstract

Purpose of Review This review of the literature aims to explore the impact of the COVID-19 pandemic and the lockdown on teenagers' mental health. We distinguish two groups: adolescents who had already been diagnosed with a mental disorder and the general population of adolescents.

Recent Findings An increase in the number of mental health-related difficulties in adolescents has already been reported in previous health crises. Accordingly, the perceived well-being of teenagers declined during the COVID-19 pandemic. Adolescents with mental disorders were significantly more affected by the lockdown than those in the general population.

Summary The effect of the COVID-19 crisis on the mental health of adolescents has been heterogeneous. The first pandemic wave was essentially associated with an increase of internalizing symptoms in adolescents, particularly anxiety, depression and eating disorders. The impact on externalizing symptoms was less clear, and seem to concern mostly adolescents with pre-existing behavioral disorders. During the second and later waves of the pandemic, an upsurge of suicidal ideation and attempts among adolescents have been reported in many countries.

Keywords Pandemic · Mental disorder · Anxiety · Depression · Behavioral disorder · Suicide

Introduction

The coronavirus disease 2019 (COVID-19) pandemic began in China in December and soon affected the whole world. The coronavirus 2 version of Severe Acute Respiratory Syndrome (SARS-CoV-2) can cause respiratory symptoms, fever, coughing and, in the worst cases, pneumonia, kidney failure and even death [1]. In October 2021, when the COVID-19 pandemic was still very active in some countries, it was responsible for over 4 800 000 deaths [1]. In order to curb its propagation, exceptional health precautions have been set up in most countries worldwide [2].

This health crisis has led to a complete upheaval in the organization of society: lockdown, schools being shut down

and family relations being reorganized. The COVID-19 pandemic and the lockdown have also had a strong impact on world economy, with a severe loss of jobs [3]. This reorganization has directly affected the adolescent population as teenagers got stuck at home with their families, under the unusual conditions of home schooling.

Continuity of home schooling was a major challenge for adolescents and their families during the lockdown period and may have contributed to the reinforcement of preexisting inequalities among those who are most in need of help. For instance, in France 2% of homes with youngsters aged under 17 are not equipped with internet and 49% of families have at least one schoolchild who has to work in a shared room [4]. Educational issues during the pandemic were sometimes a source of stress for the youngsters [5]. Besides, school and extracurricular activities are places where socialization is privileged and peer group attendance plays an essential role in their developmental trajectory, more so than in any other stage in life [6].

Social isolation and feelings of loneliness can lead to the development of anxiety and depression symptoms among children and adolescents [7]. Beyond social habits, this population is also sensitive to changes in the rhythm of

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their daily life [8]. The lockdown may have sometimes had a deleterious impact on adolescents' health. Some studies in Europe, South America and Asia have shown significant changes in eating habits [9] and a decrease in physical activity among adolescents compared to the pre-pandemic period [10].

Whereas home confinement for some was the occasion to improve family relationships, it may have meant an increase in domestic conflicts for others [4, 11]. Periods of economic crisis are particularly well-known for being associated with an increase in domestic violence [12]. For example, from 2006 to 2014 in Greece, the lowering of family revenues was associated with an increase in conflicts and violence within families and an increase in pressure at school among adolescents as well. An increase in cannabis use was also found [13].

Thus, the COVID-19 pandemic and its consequences on the adolescents' lives may have been mediated by stress and trauma factors. Experiences of previous health crises have shown that this type of event can promote the onset of anxiety and post-traumatic symptoms in children and, more generally, in families [14]. Nevertheless, that particular study referred to interviews with parents of children who had experienced epidemic waves (mostly H1N1) but did not distinguish the effects specifically according to age.

The COVID-19 health crisis has already been associated with a significant decrease in the perceived well-being of adolescents [15]. Indeed, the current context of the pandemic and the experience of the lockdown seems to have had a negative impact on their emotions and behaviors [16, 17] and, more generally, their mental health [18•]. They represent a population which is vulnerable to stress factors [19], particularly, adolescents with mental disorders whose access to care may have been disturbed by health precautions [18•] and for whom the sensitivity to the environment may be increased [19–21]. In Canada, adolescents with mental health-related difficulties were significantly more affected by the lockdown in terms of wellbeing, compared with adolescents from the general population [18•].

All these findings incited us to make a more detailed investigation into the impact of the COVID-19 pandemic on mental health in adolescents and to explore the risk factors associated.

Methods

We reviewed all articles dealing with the mental health of adolescents during the COVID-19 crisis. We looked for 2020 and 2021 publications in the MEDLINE database by combining the MeSH terms “Adolescent” and “coronavirus” to which we then added the terms “mental health” or “suicide” or “aggression” or “anxiety” or “mood disorders”

or “post-traumatic stress disorders” or “eating disorders” or “behavioral disorders” or “lockdown.” A total of 1017 publications were screened. Our selection criteria were that the articles had to be about or include adolescents and deal with the impact on their mental health. The initial screening of articles was made by reading titles and, if necessary, abstracts. We retained 46 articles for our literature review. Some articles were extracted from the references. The publications were written in English and French and concerned European, Asian and American populations. Most of them covered descriptive studies but also authors' reflections and guidance for families and mental health professionals. Other literature reviews were also consulted. Studies prior to the COVID-19 pandemic, as well as data on the adult and student populations could be used if they provided relevant items for our reflection.

We describe our results according to the *International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10)* [22], with a specific focus on disorders classified as “Behavioral and emotional disorders with onset usually occurring in childhood and adolescence” (codes F90-F98). We considered emotional disorders as internalized disorders because they are related to negative affectivity. Behavioral disorders are characterized as externalized disorders because they refer to behavioral expressions. Since suicide attempts are not referenced as a mental disorder in ICD-10, we have chosen to include these behaviors in our externalized behavioral disorders section.

In our Results section, we will first address data related to externalized behavioral disorders (Fig. 1), particularly suicidal ideation and suicidal behavior [III.a], aggression, and addictive behavior [III.b]. Later, we will deal with internalized behavioral disorders (Fig. 2) such as anxiety, depression, post-traumatic stress disorder [III.c] and eating disorders [III.d].

Results

Suicidal Ideation and Behavior

Confinement measures, especially within families affected by unemployment, illness or domestic violence, could represent adverse childhood experiences and increase the risk of SB in adolescents [23]. Feelings of loneliness and depression are also risk factors for suicide among adolescents [24]. Lockdown measures could thus have increased SB in adolescents. However, reports during and after the confinement measures are divergent.

During lockdown in Japan, there was no significant increase in the suicide rate among youngsters aged under twenty when schools were shut down from March to May 2020. Regression analyses carried out using public

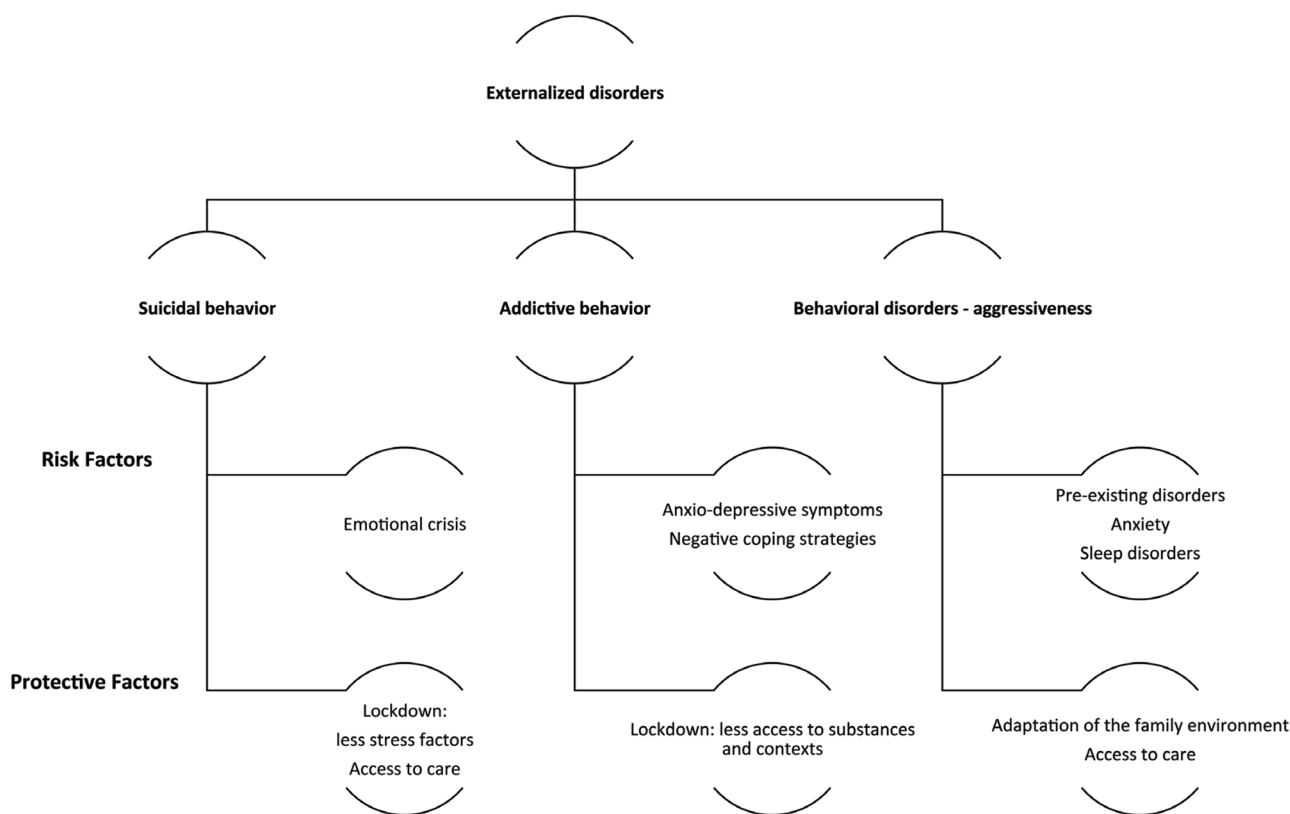


Fig. 1 Risk and protective factors of externalized disorders in adolescents during the COVID-19 pandemic

sociodemographic data showed a slight decrease in the suicide rate compared with the same time of year in 2018 and 2019, but the study did not evaluate suicide ideation or attempts and covered only the first months of the COVID-19 pandemic [25]. Visits to the emergency department (ED) for psychiatric reasons decreased by 42% compared to 2019 during the lockdown period in Paris hospitals (France), especially in the 16-24-year-old age group [26]. A later retrospective study also in Paris found a 50% decrease in pediatric admissions related with SB during lockdown (Mars to May 2020), compared to adjacent time periods [27]. Although not restricted to adolescents, the average number of ED visits for suicide attempts or suicidal ideation in Madrid decreased among the general population in 2020 compared to the previous two years [28]. However, the decline in SB during the lockdown may be due to an actual reduction in suicidality but also to a decrease in the use of emergency services. A cross-sectional survey on more than 8000 persons aged 14 to 21 in Mexico informed a 21% rate of self-reported SB during the confinement [33].

More recently, a study comparing data from Mars 2020 to Mars 2021 with the prior year in Catalonia found a strong increase in the number of suicide attempts among adolescents starting after the end of confinement measures in Spain, in September 2020 [29]. The change was particularly

prominent among girls, topping at a 195% increase. Epidemiological data in the USA show a similar tendency, ED visits for suicidal ideation or behavior decreased in the first months of the pandemic just after the declaration of national emergency and then increased during summer 2020. The rates continued to rise through the winter 2021 among adolescent girls (up by 50% compared to 2019) while staying constant in adolescent boys [30••].

In the early stages of the COVID-19 pandemic, confinement measures kept several anxiety factors at bay, such as a stressful school environment [31]. The health crisis encouraged also the use of online consulting and other alternative means for access to care. While this may have limited access to care for disadvantaged persons, it may have facilitated it for others, including suicidal adolescents [32]. Confinement was also the occasion to strengthen family relations and perceived support, reducing cognitive distortions, such as perceived burdensomeness and thwarted belongingness, which are linked with SB. Some consequences of the pandemic could thus have constituted protective factors against SB in adolescents [33]. The accumulation of risk factors during the pandemic, in particular the increase in internalized symptoms, seems to have favored situations of emotional crisis over the long term, thus leading to a subsequent increase in SB among adolescents (Fig. 1) [29, 33, 34].

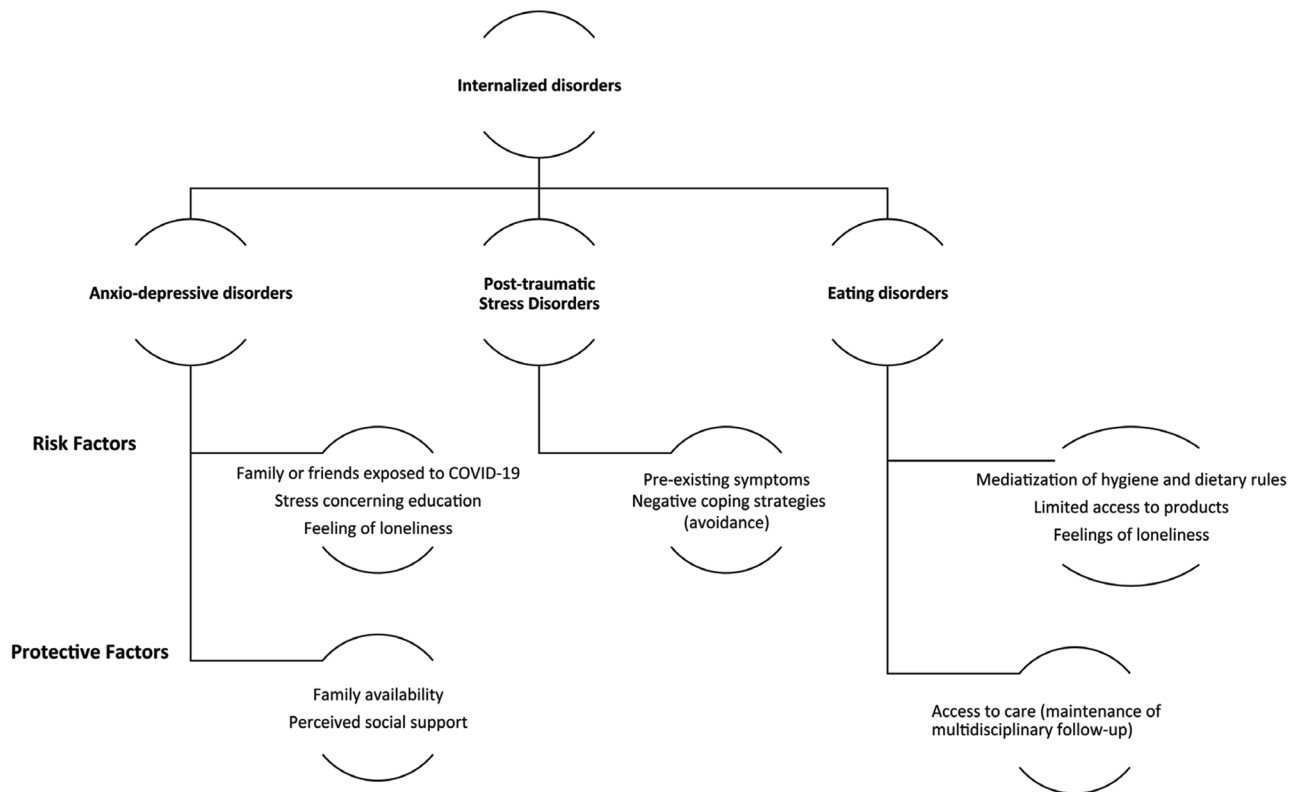


Fig. 2 Risk and protective factors of internalized disorders in adolescents during the COVID-19 pandemic

Aggression and Addictive Behavior

In adolescents, negative emotions can result in greater irritability, aggressiveness and oppositional behaviors [21]. Adolescents with neurodevelopmental disorders such as attention deficit/hyperactivity disorder (ADHD) or autism spectrum disorders (ASD) were at a risk of exhibiting behavioral disorders during the lockdown period [21, 35, 36].

In France, an online survey of parents of children with ADHD found that about one third of them (34%) observed a worsening of their child's disorder during the lockdown. This aggravation was characterized by an increase in motor agitation, temper tantrums, oppositional and aggressive behavior. It appeared to be underpinned by anxiety, sleep disturbances (disruption of the circadian rhythm) and refuge in video games. A similar rate of parents (30%) reported a reduction in their child's inattention symptoms and agitation, related to a reduction in the constraints usually imposed by schooling [37]. In Italy, 35% out of 527 parents of children with ASD interviewed through a structured questionnaire reported an increase in the intensity of their child's behavior disorders and 41.5% noted an increase in the frequency of the crises during lockdown. The major predictive factor was the pre-existence of behavioral disorders. A large majority of families expressed difficulties to adapt themselves to the

lockdown, particularly in the management of daily activities [38]. In both studies, behavioral changes are reported by parents based on qualitative data. Adolescents were not directly questioned, which does not allow a more specific exploration of their own experiences regarding anxiety or perceived stress in particular.

As far as the general population is concerned, a Chinese study conducted among students during the COVID-19 crisis nevertheless shows that the impact of the epidemic was not significantly related to aggressiveness which, on the contrary, appears to have been reduced in the worst hit geographical areas. Anxiety and altered quality of sleep were risk factors for aggression in this study [39].

The lockdown also encouraged the use of the internet and screens, essential for students to continue their education and maintain contact with peers during confinement [40]. However, an extensive use of screens, particularly during the night hours, has been associated with negative consequences such as disrupted sleep rhythms [41]. In India, over one hundred students from a cohort formed prior to the pandemic were questioned about their gaming behavior during the lockdown. Half of them reported an increase in gaming behavior during this period. Nevertheless, the authors did not observe any development or increase in problematic gaming behaviors. Students for whom gaming increased

experienced more anxiety and stress about their schooling. They identified gaming as a strategy for coping with the perceived stress [5].

Conversely, in terms of substance use, a Canadian study showed a drop in heavy consumption among adolescents compared to the weeks prior to the lockdown. The authors make the link with the difficulty of access to certain substances in this context (electronic cigarette cannabis). Concerns about image among peer group, fear of the coronavirus and depressive affects were predictive factors of substance used in this study [42]. A second study also found a reduction in substance use among adolescents from clinical and community cohorts in Canada, compared to two months prior to confinement [18•]. Similarly, a large population-based longitudinal study in Iceland reported a significant reduction of alcohol, tobacco and e-cigarettes use in the 15-18 year-old group during the pandemic compared with previous years [43].

Two American studies show similar, but nuanced, results [44, 45]. In the first of them, 36.5% of young minors using the electronic cigarette before the crisis of COVID-19 had stopped smoking by May 2020 while 16.6% increased the amount of nicotine and 8.4% increased the THC consumption over the same period [44]. A longitudinal cohort study of 7842 adolescents interviewed between May and August 2020 found that substance use rates remained stable over time [45]. Anxiety-depressive symptoms and loss of family income in the context of the health crisis were associated with increased substance use [44, 45].

In summary, the impact of the COVID-19 crisis on aggressive and addictive behaviors depends on the population studied. The crisis, and particularly the confinement, seems to have favored the increase of externalized symptoms among adolescents with neurodevelopmental disorders and pre-existing behavioral problems [37, 38]. In the general adolescent population, there was no increase in aggressiveness or addictive behaviors [18•, 36, 42]. Confinement even seems to have played a protective role, probably mediated by a limited access to the substances [42, 45]. The relationship between the COVID-19 crisis and externalized behavioral disorders appears to be moderated by certain internalized symptoms such as anxiety, depression, worries about the pandemic or sleep disorders (Fig. 1) [18•, 36–38, 42, 44, 45].

Anxio-depressive Disorders and Post-traumatic Stress

The reduction in social contact due to the closing of schools and colleges could increase the risk of anxiety and depressive disorders in adolescents [16, 17]. Most studies on adolescents conducted in the course of this health crisis report high rates of anxiety-depressive symptoms [46, 47]. A large

cross-sectional online survey carried out among Chinese adolescents aged twelve to eighteen estimates the prevalence rate of depression and anxiety symptoms at 43.7% and 37.4%, respectively, during the pandemic. Teenage girls seem to present a higher risk than boys of developing symptoms of anxiety and depression. Furthermore, this study brings forth a strong negative correlation between the difficulties related to mental health and the level of information and prevention concerning COVID-19 [46].

A longitudinal study conducted in Norway between February 2019 and June 2020 among adolescents aged 13–16 years shows a significant increase in anxiety-depressive symptoms, particularly among girls, since the beginning of the COVID-19 crisis. Living in a household with low socioeconomic level and a single parent were associated with these symptoms. The authors nevertheless encourage us to be cautious in interpreting these results, which could also be associated with the participants' age progression [48]. A second longitudinal study conducted in Iceland using three waves of school surveys (2016, 2018, 2020) among adolescents aged 15 to 18 show a significant increase in depressive symptoms, particularly among girls, between 2016 and October 2020 [43].

According to a general population survey conducted two weeks after the beginning of COVID-19 in China, 14.4% of adolescents and young adults reported symptoms of post-traumatic stress disorder (PTSD) [47]. Adolescents undergoing treatment for a major depressive episode in a cross-sectional study of Chinese adolescents were more likely to present PTSD symptoms one month after the onset of the COVID-19 crisis compared to control subjects [49]. Both studies highlight the importance of avoidance behaviors on mental disorders.

In summary, the COVID-19 crisis increased the risk of anxiety, depression and PTSD among adolescents. Socio-environmental vulnerability factors, worry about being affected by the disease and isolation due to health restrictions, pre-existing internalizing disorders and using negative coping strategies appear as key factors. Young girls were found to be the most affected. (Fig. 2) [50••].

Eating Disorders

Adolescents with eating disorders can be considered as a population at risk. Indeed, their problems may be accentuated by the "containment effect": psychological discomfort, related medical problems, emotional isolation, social and family difficulties [51]. In 2020, some studies have been published regarding adolescents but they focus mainly on the consequences of the lockdown and the way health-care management was adapted [52–56]. Strict, inflexible dietary behaviors with a reduced range of foods may have been affected by the limitations in market supply and lead

to family conflicts. Thus, the lockdown conditions could exacerbate negative affectivity and comorbid conditions in patients with eating disorders [56]. At the same time, state health responses to the spread of the SARS-CoV-2 epidemic have imposed coping challenges on medical institutions. The challenge has been to remotely monitor weight changes and physiological status, while offering psychological and emotional support [52–55]. The media coverage of dietary hygiene rules during lockdown may also play a role. The promotion of an ideal of thinness and the stigmatization of overweight people may have rigidified the control of self-image [57, 58].

A retrospective study at the Perth Children's Hospital in Australia found a 104% increase in the number of anorexic patients under the age of 16 admitted for somatic stabilization (severe undernutrition, risk of cardiovascular distress) in comparison with previous years [59]. Similar results were obtained in the USA showing a significant increase in the use of medical care for eating disorders after the implementation of restrictions due to the COVID-19 crisis among a population aged 8 to 26 years [60]. The explanatory hypothesis advanced by the authors is that health measures of social restriction have led to the loss of several protective factors and promoted comorbid symptoms/pathologies. In addition, delayed care because of the pandemic is probably associated with more ED visits and more severe clinical presentations.

Thus, it appears that the COVID-19 crisis, and particularly the confinement, was associated with an increased incidence of adolescent eating disorders, or at least an increase in the use of healthcare services for this reason. The impact of confinement on eating habits, the social isolation and the presence of comorbid internalized symptoms have been identified as risk factors in this population. The continuity of a multidisciplinary follow-up could nevertheless play a protective role (Fig. 2) [52–55].

Discussion

In this review, we explored the impact of the COVID-19 pandemic on adolescent mental health. We found that the health crisis was a risk factor for internalized disorders (anxiety, depression, PTSD symptoms and eating disorders) [47, 48, 60] and it was associated with an increase in SBs in the longer term [61]. Adolescents with pre-existing disorders were particularly vulnerable [50••].

Consequences on the Mental Health of Adolescents

Among the general adolescent population, the literature highlights the influence of the health crisis on the

development of anxiety and depressive symptoms [46]. The environmental consequences related to the COVID-19 crisis also constituted a risk factor for adolescents with eating disorders [56]. The impact on externalized disorders appears to be more subtle [25, 39].

The data show that the presence of several vulnerability factors such as hyperkinetic disorders and sensitivity to changes in daily routines are risk factors for behavioral disorders in children and adolescents [37, 38, 62]. These results seem to be mediated by anxiety levels, sleep disorders, and the environmental and familiar context (reduced parental availability and negative emotions) [62]. While preliminary studies show an increase in the use of screens and video games during confinement [40, 40], excessive substance use among adolescents appears to have declined [18•, 42]. Indeed, certain stress factors have decreased at the beginning of the pandemic, such as bullying at school and academic and social pressure. In some families, parents were more available and also less exposed to anxiety-provoking factors. These conditions may have promoted a sense of support and resilience among adolescents [20, 37, 63, 64].

However, observations made at the beginning of the health crisis are reversed when taking into account a longer temporality. For instance, several studies published in 2021 show an increase in suicidal ideation and suicide attempts among adolescents [29, 30••, 61].

Advice for Families and Primary Prevention

Several articles and recommendations on prevention are available to help families and professionals.

Families are recommended to be attentive to healthy living, especially sleep [63, 65–67]. The management of screen time was also highlighted during the lockdown [68, 69].

The literature also emphasizes the need for coping strategies in times of health crisis, particularly for lockdown periods [65, 70]. Actively seeking strategies to handle crisis-related concerns and social distancing measures were encouraged. This could include maintaining social contact via available technology, learning about COVID-19 from credible sources of information or identifying effective emotional management strategies used in the past, for example [65]. These recommendations are relevant to the entire family, including children and parents. Indeed, past experience shows that active parental coping strategies are a protective factor against negative affect in their child in times of crisis [70]. For adolescents with pre-existing disorders who are particularly sensitive to changes in their environment and daily rituals, it is advisable to maintain a regular link with the care structure [71, 71].

Re-organizing Care for Mental Health

The health crisis has led to the reorganization of mental health services. First, during the lockdown period, telecommunications had to be promoted to ensure the care of patients [64, 72, 73]. An ongoing study protocol on a randomized trial is exploring the effects of brief on-line therapy on eleven to eighteen-year-old adolescents with anxiety disorders during the pandemic. The results of this study may contribute to supporting the interest of developing this type of care [74].

Secondly, hospital pediatric EDs have been particularly solicited for the management of adolescents. Indeed, the literature shows an increase in emergency room visits for eating disorders with severe somatic consequences, but also for suicidal ideation and suicide attempts among adolescents. This last increase is particularly observed during the most recent period of the pandemic, i.e., at a distance from the first wave and the first confinement [30••, 60, 61].

Thirdly, the pandemic has reduced the accessibility to healthcare in many cases. This concerns specifically adolescents with a precarious socio-familial environment (low socio-economic status, migrant family). Adolescents with pre-existing mental disorders or special needs were at a greater risk of developing negative emotions during the COVID-19 crisis.

Conclusion

Adolescents were affected by the reorganization of society due to the COVID-19 health crisis, and the lockdown in particular. The COVID-19 pandemic appears to have promoted the emergence of internalized symptoms among the general adolescent population and may have contributed to increase the occurrence and severity of these symptoms among those with pre-existing mental health conditions. The findings are more qualified for externalized disorders, in which adolescents with pre-existing behavioral disturbances are the most affected. Lockdown measures seem to provide also protective factors that lead to an initial decrease in SB and substance use problems. However, SBs have increased significantly among adolescents, particularly adolescent girls, in the later phases of the crisis. Wade et al. emphasize the interest of developing longitudinal studies to evaluate the effects of long-term confinement on the mental health of adolescents. The authors distinguish *five* common effects in psychopathology during development that may be explored: *cumulative risks*, *sleeper (latent) effects*, *sensitizing effects*, *mechanistic effects* and *resilience* [75].

The COVID-19 crisis has also given us the opportunity to develop other management methods. Based on this experience, it appears essential to pursue research about teleconsultation for adolescents, in order to validate these new

practices scientifically. Mental healthcare services, after the challenge of adaptation imposed by the health measures in the early days of the pandemic, are now working to accommodate and care for a large number of vulnerable adolescents affected by the COVID-19 crisis.

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Compliance with Ethical Standards

Conflicts of Interests/Competing Interests The authors have no relevant financial or non-financial interests to disclose.

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