Mental health problems predict inequalities in accessing online classes during COVID-19 pandemic in youth

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Abstract

Background: Schools have adapted to the online environment during the COVID-19 pandemic, but the factors influencing access to online resources and the impact of these changes on youth mental health are largely unknown. The current study has two aims (1) to investigate if mental health problems previous to the COVID-19 pandemic are associated with access to online learning; (2) to investigate whether those accessing online learning have lower levels of mental health problems during the COVID-19 pandemic.

Methods: The sample consisted of 672 young people (16 - 24 years of age) from the Brazilian High-Risk Cohort that were enrolled into an educational institution and had access to the internet. Participants were evaluated during the COVID-19 pandemic and in a previous time point. A total of 511 students were enrolled in online classes, while 161 were not enrolled. Psychopathology was measured using the Strengths and Difficulties Questionnaire (SDQ) in both time-points. Attendance to online classes during the COVID-19 was obtained by self-report. Data were analyzed using multiple regression models.

Results: Prospective analysis revealed that every one-point increase in the total SDQ score before COVID-19 pandemic was associated with an increase of 6% in the chance of a participant not accessing online classes, above and beyond previous negative school events, such as suspensions and grade repetition and other confounders (adjusted OR 0.94; 95%CI 0.91-0.98; $p=0.0009$). Cross-sectional analysis revealed that participants that accessed online classes had a slightly lower number of inattention/hyperactivity problems if compared to those without online classes (Cohen's $d=0.25$; $\beta=-0.63$, $p=0.006$); however, those results were fully explained by previous symptoms of inattention/hyperactivity.

Conclusion: Children with pre-pandemic mental health problems have disproportionately lower access to educational resources during the pandemic if compared with the general population, which might widen the gap of opportunities for this underserved population to thrive.

Keywords: Online learning; Psychopathology; Mental Health; Youth; COVID-19

Introduction

School closures represented a big challenge for societies during the early days of COVID-19. It was estimated that by April 2020, 90% of world students were affected, and the impact on youth mental health is still unknown (Donohue & Miller, 2020; J. Lee, 2020). During this time, online learning became the norm for most educators, families and students (Dhawan, 2020), and therefore an important factor in both education and mental health.

Previous evidence demonstrates longitudinal associations between mental health conditions and educational attainment. It is estimated that mental health problems were responsible for up to 10% of early school termination before the COVID-19 pandemic (Breslau et al., 2008; Dalsgaard et al., 2020; S. Lee et al., 2009; Wickersham et al., 2021). This early impact of mental health in educational attainment may have long term impacts on life chances by increasing educational inequalities due to losses in mental health capital (Laceulle et al., 2020; Sallis et al., 2019; Thompson et al., 2021). But there is still no evidence of associations between mental health and educational attainment in online environments.

Adolescent's online behavior, including screen time and digital technology use, has fueled a controversial debate for the past years (Haidt & Allen, 2020). Some argue that digital screens are contributing to mental health burden (Twenge & Campbell, 2018) while others don't report a relevant association (Orben & Przybylski, 2019; Vuorre et al., 2021). However, during COVID-19 restrictions, this relationship may have changed significantly, and there is evidence that digital exclusion predicted worse mental health in adolescents (Metherell et al., 2021).

In order to understand the effects of online learning on mental health and vice-versa, studies should address both current and past symptoms. Therefore, the current study investigates bidirectional associations between online learning and youth mental health problems during the COVID-19 pandemic, using a longitudinal design from a youth cohort sample.

Methods

Participants and study design

A total of 1591 subjects from the Brazilian High-Risk Cohort for Mental Conditions (BHRCS; (Salum et al., 2015) were assessed by self-report at two time points: previous to COVID-19 pandemic (2018/2019) and during the COVID-19 pandemic. The BHRCS is a school-based community cohort from the cities of São Paulo and Porto Alegre. The study

consists of three waves and an additional COVID wave conducted during the pandemic (from April 2020 to April 2021). The total sample comprised 2511 children and adolescents, with one subgroup randomly selected, and the other selected on the basis of a high-risk score for psychopathology. For a detailed description of the cohort, see Salum *et al.*, 2015 and the project webpage on the Open Science Framework (<https://osf.io/ktz5h/>). The Institutional Review Boards of all institutions involved in the study gave approval for the research protocol, and all participants, parents, or caregivers gave informed consent.

During COVID-19 wave, 788 (mean age =19.1, sd=1.87; males 53.4%) participants reported being registered in an educational institution (either secondary school or university). From these enrolled students, 568 reported attending online classes, while 197 reported no online classes, and others reported in person classes (4) or had missing data for these questions. We further filtered the sample by having access to the internet, to avoid having internet access as a confounding variable when comparing those with and without online classes. The final sample consisted of 511 students enrolled in online classes vs. 161 not enrolled in online classes. Participants had a mean age of 17.4 years old (range=13.8-22.6) at baseline wave and a mean age of 19.1 years old (range=16.1-24.3) during COVID-19 wave, 46.6% were male. Days since school closure were calculated by subtracting the participants' phone interview date with the first lockdown date in Brazil (March 15th of 2020). Participant's characteristics of both groups are shown on Table 1.

Online classes and psychopathology measures

Online learning was assessed during the COVID-19 wave by asking participants "Are you having online classes"? Psychopathology was measured dimensionally at baseline and in the COVID wave using the self-report version of the Strengths and Difficulties Questionnaire (SDQ; (Goodman et al., 2000). The SDQ self-report is a 25-item questionnaire that assesses emotional, behavioral and social problems, yielding a total score including all items, as well as specific scale scores for emotion, conduct, hyperactivity and peer problems. We used these four subscales to our final total score symptom composite. SDQ total scores can result in scores that vary from 0 to 40; and subscale scores can result in scores that vary from 0 to 10.

Additional baseline data included IQ (WISC-III, (Wechsler, 2002) and parent-reported data on socioeconomic status (ABEP, (Brasil, 2008) and school events (e.g. class suspensions and academic repetitions). Economic difficulties faced during COVID-19 were assessed by self-report ("How much did changes related to COVID-19 in your region create financial problems for you or your family?" on a 5-point scale).

Data Analysis

First, we performed logistic regressions with online learning as the outcome and previous mental health symptoms as a predictor, in order to investigate the impact of current and previous psychopathology on youth online learning. Second, we performed linear regression models with symptoms as the outcome and online learning as a predictor to investigate the influence of online learning on youth mental health during COVID restrictions. In both models, age, sex, socioeconomic status, number of days since school closure at the interview date, previous school events (e.g. suspensions and repetitions), IQ and financial difficulties during COVID-19 were included as potential confounding variables. Standardized effect sizes measures are presented alongside regression estimates. Cohen's d of 0.2, 0.5 and 0.8 indicate small, medium and large standardized effects; whereas Cohen's partial f^2 of 0.02, 0.15 and 0.35 indicate small, medium and large standardized effects; and partial r^2 of 0.02, 0.13 and 0.26 indicate small, medium and large standardized effects (Cohen, 1988).

Results

Table 1 – Participant characteristics				
	Online learning (n=511)		No online learning (n=161)	
	Mean (sd)	Min-Max	Mean (sd)	Min-Max
Age (years)	19.1 (1.89)	16.1 - 24.3	19.1 (1.9)	16.2 - 24
Socioeconomic score (ABEP)	25.97 (7.56)	10 - 67	25.23 (8.01)	10 - 47
SDQ total COVID	13.06 (6.39)	1 - 32	13.78 (6.55)	2 - 34
SDQ total previous	13.52 (6.21)	0 - 33	15.24 (6.01)	2 - 33
SDQ Hyp COVID	4.16 (2.53)	0 - 10	4.8 (2.62)	0 - 10

SDQ Hyp previous	4.55 (2.46)	0 - 10	5.15 (2.66)	0 - 10
SDQ Con COVID	2.5 (1.66)	0 - 8	2.65 (1.82)	0 - 9
SDQ Con previous	2.44 (1.67)	0 - 8	2.95 (1.8)	0 - 8
SDQ Peer COVID	2.54 (1.72)	0 - 10	2.66 (1.71)	0 - 8
SDQ Peer previous	2.34 (1.75)	0 - 9	2.82 (1.88)	0 - 9
SDQ Emo COVID	3.84 (2.79)	0 - 10	3.77 (2.58)	0 - 10
SDQ Emo previous	4.15 (2.67)	0 - 10	4.4 (2.49)	0 - 10
Number of days	95.7 (78.9)	22 - 397	71.6 (54.3)	20 - 407
IQ	103.1 (14.9)	60.9 - 146.6	100.8 (16.5)	46.3 - 139.5
School events	7.4% repetitions; 3.1% suspensions		11.2% repetitions; 1.2% suspensions	
Sex: males n (%)	49.2%		60.8%	

Table 1. Sample characteristics and scale scores. ABEP (*Associação Brasileira de Empresas de Pesquisa*); SDQ (Strengths and Difficulties Questionnaire); Hyp (hyperactivity); Con (conduct); Peer (peer problems); Emo (emotional problems).

Are mental health problems previous to the COVID-19 pandemic longitudinally associated with lower access to online learning resources?

Students with higher levels of mental health problems previously to the COVID-19 pandemic, according to SDQ total problems score, attended significantly less online classes (OR 0.95, 95%CI 0.93-0.98, $p=0.002$). Results remained significant when adjusting for age, sex, socioeconomic status, number of days since school closure, previous school events, financial difficulties, and IQ (adjusted OR 0.94, 95%CI 0.91-0.98, $p=0.0009$). We also observed an association of online classes with the number of days since school closure (more days, more online classes; adjusted OR 0.99; 95%CI 0.99-1, $p=0.003$) and sex, with girls having more online classes than boys (adjusted OR 2.39; 95%CI 1.53-3.73, $p=0.0001$). No associations with other confounding variables emerged.

Finally, these effects were observed for overall psychopathology as well as for hyperactivity (OR 0.91, 95%CI 0.84-0.98, $p=0.013$), conduct (OR 0.84, 95%CI 0.76-0.84, $p=0.002$) and peer problems (OR 0.87, 95%CI 0.78-0.96, $p=0.006$), but not for emotional problems (OR 0.96, 95%CI 0.9-1.03, $p=0.306$). After adjusting for potential confounding variables, results were also significant for hyperactivity (OR 0.91, 95%CI 0.84-0.99, $p=0.026$), conduct (OR 0.82, 95%CI 0.73-0.93, $p=0.001$) and peer problems (OR 0.86, 95%CI 0.77-0.97, $p=0.011$), but not for emotional problems (OR 0.92, 95%CI 0.85-1.01, $p=0.08$).

Are online classes associated with lower levels of mental health problems during COVID-19 pandemic?

Cross-sectional analyses demonstrated no significant association between having online classes and SDQ total score during COVID-19 restrictions (Cohen's $d=0.12$; $\beta=-0.8$, $p=0.172$), neither with emotional (Cohen's $d=0.03$; $\beta=0.07$, $p=0.772$), conduct (Cohen's $d=0.08$; $\beta=-0.14$, $p=0.361$) and peer problems subscales (Cohen's $d=0.07$; $\beta=-0.12$, $p=0.442$). There was an association between having online classes with lower hyperactivity symptoms during COVID-19 (Cohen's $d=0.25$; $\beta=-0.63$, $p=0.006$). This association remained significant when considering age, sex, socioeconomic status, previous school events, IQ, financial problems, and number of days since school closure (partial $f^2=0.013$; $\beta=-0.7$, $p=0.008$). However, when we additionally included previous hyperactivity symptoms as a covariate, prior to the COVID-19 pandemic, this association was no longer significant (partial $f^2=0.006$; $\beta=-0.39$, $p=0.08$). This suggests that those differences were explained by inequalities in accessing online learning resources due to previous symptomatology.

Overall, mental health symptoms during COVID-19 were higher in those with higher levels of previous symptoms (partial $r^2=0.34$; $\beta=0.58$, $p=2 \times 10^{-16}$), girls (partial $f^2=0.04$; $\beta=2.12$,

$p=3.6 \times 10^{-6}$) and those experiencing financial difficulties during the pandemic (partial $r^2=0.07$; $\beta=1.14$, $p=2 \times 10^{-9}$).

Discussion

Our study demonstrates that previous mental health problems predicted reduced access to online classes during the COVID-19 pandemic among youth enrolled in educational institutions and with access to the internet. This effect was observed for overall psychopathology, as well as for specific dimensions of conduct, hyperactivity, and peer problems. We also found that girls had more access to online classes than boys. Importantly, the effect of symptoms in accessing online class was not explained by the time since the pandemic onset, socioeconomic factors, age, sex, previous school events (e.g. class suspensions and course repetitions), IQ or financial difficulties during the pandemic.

Previous studies have demonstrated that mental health problems are a risk factor for lower academic achievement and school dropout (Breslau et al., 2008; Dalsgaard et al., 2020; Hoffmann et al., 2021). It is estimated that around 5-10% of repetitions and age-grade distortions would not occur if mental health problems were prevented in Brazil (Hoffmann et al., 2021). During the COVID-19 pandemic, health care and economic disruptions were also predicted by previous psychological distress (Gessa et al., 2021). All these studies provide evidence that mental health inequalities have an impact on education and other life outcomes. As for digital screens, a previous study from our group also suggests that psychopathology influences future technology use, rather than the other way around (Bado et al., 2020).

Our study has a number of strengths. First, we take advantage of a previously established cohort that has assessments of psychopathology previous to the pandemic and during the COVID-19 pandemic. Second, we were able to adjust our analysis to a number of potential confounders, and results were robust after accounting for important predictors. However, some limitations should also be noted, such as lack of information about the level of engagement or performance in online classes. Future studies should address these points, taking into account the importance of students' previous mental health in educational outcomes.

In summary, we demonstrate that previous youth mental health problems impacted access to online class during the COVID-19 pandemic above and beyond other relevant factors associated with school attainment. Early interventions in mental health and public policies focusing on reducing mental health inequalities might thus increase youth access to education and life opportunities.

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