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Children's behavioral problems, screen time, and sleep problems' association with negative and positive parenting strategies during the COVID-19 outbreak in Brazil

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ABSTRACT

Families' health, safety, and economic stability were jeopardized during the pandemic. Parental stress is a risk factor for hostile and less supportive parenting. Parenting styles are a set of attitudes, feelings and behaviors related to parenting that modulate the child's psychosocial functioning and might impact on the adaptability to a stressful time.

Objective: To investigate the group differences among children raised by negative and positive parenting families during COVID-19 pandemic.

Methods: We have done an online survey with 329 parents. Parents answer about parenting strategies and styles, children's behavior, Covid related questions, socio-economic information, sleep and gaming disorders.

Results: Parents' frequent use of negative strategies were a risk factor to have a negative outcome related to mental health, games, sleep, and children behavior.

Discussion: Parenting strategies are some targets pointed in this study for intervention. Parents' styles and strategies training to better manage children might be even more important to avoid negative consequences for children in stressful times.

1. Introduction

The COVID-19 pandemic, provoked by the rapid transmission of the SARS-CoV-2, increased the stress experienced by families around the world in 2020 (Bavel et al., 2020; Chung, Chan, Lanier, & Ju, 2020). Stressors related to the pandemic are jeopardizing families' health, safety, and economic stability (Brown, Doom, Lechuga-Peña, Watamura, & Koppels, 2020), even if they were not directly affected by the virus itself (Bavel et al., 2020). Profound changes in daily routines at home, school, and work, besides the uncertainties surrounding the COVID-19 infection, may underlie the stress induced by the pandemic. For parents, unemployment and
financial strain due to economic changes associated with COVID-19 outbreak can also be a burden (Brooks et al., 2020). Adults in China showed high frequencies of Generalized Anxiety Disorder (35.1%), depressive symptoms (20.1%), and sleep disturbance (18.2%) (Huang & Zhao, 2020) during the pandemic, while Brazilian adults are showing high levels of loneliness (57.1%), sadness (40.3%), and anxiety (53.1%) (Werneck et al., 2021).

The pandemic's impact has also been shown on children and adolescents (Singh et al., 2020). During the pandemic's special interest has been directed to the child's mental health, related to their exposure to uncertainties, fears, routine changes, and social isolation. According to Liu and colleagues (Liu, Bao, Huang, Shi, & Lu, 2020), children with parental presence during the pandemics have less impact on mental health in comparison with those who experience separation from their caregivers (e.g: children who are isolated after being diagnosed in local hospitals or collective medical observation centers; and children whose caregivers are infected with SARS-CoV-2). Nonetheless, even for children who are quarantined at home separated and with restricted movement with constant contact with their parents, some factors can present a negative impact on their mental health. For example, Cohodes, McCauley, and Gee (2021) found that parent anxiety-related symptomatology moderates the association between pandemic-related stress and internalizing symptomatology in their child. As pointed out by Wu and Xu (2020), familiar stress during the pandemics could be associated with adverse outcomes such as an increased risk for child maltreatment (Wu & Xu, 2020).

1.1. Behavior problems during COVID-19 pandemic

As a result of the restrictive measures used during the covid-19 pandemic, children seem to be physically less active and more bored, alongside as showing limited social interactions (Liu et al., 2021). The effect of those lifestyle changes and psychosocial stress seem to contribute to the emergence of behavioral problems (Wang, Zhang, Zhao, Zhang, & Jiang, 2020).

According to the APA Dictionary, behavior problem can be defined as “a pattern of disruptive behavior that generally falls within social norms and does not seriously impair a person's functioning” (APA, n.d.). Research on children behavior usually adopts a broad classification, with Externalizing behaviors referring to actions in the external world, and Internalizing behaviors characterizing processes with the self (Levesque, 2011). Recent research on behavior problems during the COVID-19 pandemics have been showing an increase on behavioral complaints (Dubois-Comtois, Suffren, St-Laurent, Milot, & Lemelin, 2021; Wang et al., 2020).

In a recent meta-analysis, with a total sample of 21,330 children and adolescents, authors identified that predominant behavioral problems were anxiety (prevalence of 34.5%), depression (prevalence of 41.7%), irritability (prevalence of 42.3%), inattention (prevalence of 30.8%), and sleep disturbance (prevalence of 21.3%) (Panda et al., 2021).

1.2. Sleep disturbance

Some authors propose that children's well-being has become more dependent on family's health and well-being during the pandemic, once healthcare and school's support was no longer available (Glynn, Davis, Luby, Baram, & Sandman, 2021). Along with elevated depression and anxiety levels in adults, emotional and behavioral reactions in children and adolescents are being reported, including changes in sleep (Schmidt, Crepaldi, Bolze, Neiva-Silva, & Demenech, 2020). The escalated stress and major routine changes have contributed to an increase in children's sleep time, but not in quality, with children reporting unscheduled sleep and trouble falling or staying asleep during COVID-19 (Bates et al., 2020). Many studies have shown disruptions in sleep patterns caused by the COVID-19 pandemic triggered by routine alteration and psychiatric symptoms (Dubey et al., 2020; Huang & Zhao, 2020). Sleep is crucial for children's health and well-being. Adequate sleeping is necessary for the consolidation of memory and creation of long-term memory circuits and is indispensable for maintaining brain plasticity throughout life (Graven & Browne, 2008). In adolescence, it plays an important role in cortical maturation and cognitive functioning (Tarkkh, Saletin, & Carskadon, 2016). Parenting is, hypothetically, a modifiable risk factor for childhood sleep problems (Sadah, Tikonetzky, & Scher, 2010). As a stressor, harsh parenting is able to alter the neuroendocrine regulation of sleep, which, in turn, can compromise the ability to modulate emotions (Calhoun, Ridenour, & Fishbein, 2019). Also, in ADHD children, greater parental consistency, a characteristic of positive parenting, is linked with less bedtime resistance (Sciberras, Song, Mulraney, Schuster, & Hiscock, 2017).

1.3. Gaming behavior

Pandemic's routine changes have also shown impact on gaming behavior, with increased gaming and higher volume of game downloads being observed at the time of strict lockdown measures implementation (Farhadi & Masaeli, 2021). It is proposed that school closure and hobbies inaccessibility, in addition to increased access to video games, are possible explanations for heightened risk for gaming disorders (Ko & Yen, 2020). Still, there are concerns about the impact that enduring periods of quarantine, hampered interactions, and technology-based activities might have on the risk for gaming disorders and readaptation difficulties once pandemic has passed (King, Delfabbro, Billieux, & Potenza, 2020).

Although the use of electronic devices has been encouraged, some authors stress the importance of parents controlling the reasonable use of electronic devices and the content of the games their children are playing (Panda et al., 2021). Indeed, problematic gaming seems to be related to poorer parent-child relationships, specifically, greater parental hostility and less parental affection (Schneider, King, & Delfabbro, 2017). It has been proposed that both no restriction and restriction overuse might increase aggressive behavior among children and adolescents (Clark, 2011). By contrast, more recent research has shown that higher parental restriction has a significant impact in decreased aggressive behavior (Cote, Coles, & Dal Cin, 2021).
1.4. Parenting styles and its association with behavior problem, sleep disturbance, and game usage

Albeit the encouragement for parents using the pandemic period to spend quality time with their children, to improve positive interactions and strengthen family bonds, these guidelines can be challenging. It has been suggested that some problems in the family dynamics during the pandemic should be investigated to assess the relationship between parental stress and its effect in child mental health (Wu & Xu, 2020), as, for example, the role of parental resources, perceptions, and coping strategies.

In this course of research we can mention parenting styles, a set of attitudes, feelings and behaviors that modulate the child's psychosocial functioning (Alonso-Stuyck, 2019). The Authoritarian Parenting Style (Baumrind, 1971) can be characterized by high parental control and low warmth, leading to the use of punishment, threats, verbal hostility, and physical coercion. Authoritarian parents tend to shape a child's behavior according to a high standard of conduct, tend to value obedience and respect for authority, discouraging dialogues with the child. Authoritative parents, on the other hand, exert authority and establish limits but they take the child's opinions into account (Uji, Sakamoto, Adachi, & Kitamura, 2014). The Authoritative Parenting Style (Baumrind & Black, 1967) can be defined by high parental warmth and high control, resulting in the encouragement of autonomy, high responsiveness to the child's emotional needs, and use of support and regulation as behavior control strategies.

Parenting styles are a broader concept and refer to different domains that describe this parent-to-child interaction, but literature also presents concepts to describe a set of parenting behaviors, namely positive/supportive parenting and negative/harsh parenting, which refer to warm and responsive behaviors and hostile and critical behaviors, respectively (Dallaire et al., 2006). Positive parenting has been related to reduced risk for conduct disorder, childhood depression, and socialization problems, whereas negative parenting has been associated with lower school achievement and increased risk for aggressive behavior and mental health problems (Qi, 2019; Thomson et al., 2014). Further, there is a relation between parental stress, harsh parenting, and child's behavior problems, with higher parental stress and controlling parenting attitudes promoting more behavior problems such as resistance and violence (Han & Lee, 2018).

1.5. Research question

In this study, adopting a more exploratory facet, we aim to further understand the existing problems during the pandemics on both positive and negative families. Investigating differences in children's behavior problem, gaming behavior, and sleep disturbance between positive and negative parenting families might aid awareness of important family factors which might impact children's well-being during the pandemics. Furthermore, understanding which parenting factors are associated with behavior problems, game addiction, and sleep disturbance might help to isolate targets to intervene according to family nurturing style, bringing light to the complex association between the pandemics and children's health and well-being.

Considering the impact of parenting on children's outcomes, what are the differences among houses of positive and negative parenting behaviors in children's behavior, game usage, and sleep problems during the COVID-19 pandemic? And more, what are the associations between parenting strategies and behavior problems, game addiction, and sleep disturbance during stressful times?

2. Methods

2.1. Procedures

An online survey directed to parents of school-age children and adolescents was created by the research team and distributed on social media platforms (WhatsApp, Facebook, and Instagram). Researchers posted about the survey on their social networks and asked colleagues and families to help with the dissemination. A “single image” format was selected for the survey's dissemination and included: 1) media (an image with the research group logo; 2) primary text; 3) headline; 4) description, and 5) survey's URL. The online questionnaire was generated using SoSci Survey (Leiner, 2019) and was made available to users via www.soscisurvey.de.

Parents were instructed to answer the survey on only one child, and data collection occurred from July 2020 to September 2020, reaching 1032 parents. From those, there were 539 valid questionnaires of parents reporting about their children’s behavior concerning use of games, sleep, and mental health. We excluded participants with one or more measures missing, remaining with 482 entries.

2.2. Participants

To identify parenting groups by its predominant parenting strategies or style, we divided the whole sample in quartiles depending on use of authoritative and authoritarian parenting. Parents in the 75th quartile in the authoritative parenting measure were classified as the Authoritative group (n = 109). Parents in the 75th quartile in the authoritarian parenting measure were classified as the Authoritarian group (n = 107). Participants in the 25th quartile on both authoritative and authoritarian measures were classified as the Control group (n = 113). All subjects simultaneously included in two or more groups were excluded (n = 25), as were subjects not pertaining any of the parenting groups (n = 128). Finally, the final sample comprised the three parenting groups (n = 329). All participants gave consent to participate in the study after being informed of all procedures. The present research was evaluated and approved by the ethical board of the Universidade Federal de Minas Gerais, Belo Horizonte, Brazil (CAAE: 31618720.4.0000.5149) and it follows the Declaration of Helsinki.
2.3. Parents' sociodemographic data

Age, gender, ethnicity, relationship status, education, current job situation were asked. It is important to highlight that racial measurement in Brazilian census is based on skin color, and not ancestry as in other countries, therefore, participants were asked to refer to themselves and their children as “Yellow”, “White”, “Indigenous”, “Pardo”, or “Black” (Travassos & Williams, 2004). Furthermore, information about possible events faced due to the pandemic, social distancing or isolation practicing mode, and period in isolation was collected.

2.4. Children's sociodemographic data

Age, gender, ethnicity, school type and level, previous disease, deficiency, and mental disorders were assessed. Also, information about daily screen time was collected as a control variable, once screen time has an impact on problematic game use (Karayagiz Muslu & Aygun, 2020).

2.5. Instruments

Brazilian Economic Classification Criteria (CCEB) — an instrument of economic classification through questions about the possession of durable goods and the educational level of the head of the household. A subject score can vary from 0 to 46 and be classified into one of six classes based on ABEP Criteria: A (average income of US$ 4,621.04), B1 (average income of US$ 2,039.63), B2 (average income of US$ 1,020.19), C1 (average income of US$ 557.95), C2 (average income of US$ 316.20), and DE (average income of US$ 135.59).

Parenting Style and Dimension Questionnaire — Short Version — the adapted Brazilian version consists of 32 items, evaluates three parenting styles and nine dimensions. Authoritative style (15 items): support and affection, regulation, and autonomy dimensions. Authoritarian style (12 items): physical coercion, verbal hostility, and punishment dimensions. The Permissive style (5 items) is composed of one dimension, indulgence (Oliveira et al., 2018; Robinson, Mandleco, Olsen, & Hart, 2001). In this study, only items assessing the Authoritative and Authoritarian styles were used, considering its more robust internal consistency (McDonald’s omega 0.855 for Authoritative style and 0.838 for Authoritarian style). On each item, parents had to inform the frequency they use the specific behavior described, using a 5-point Likert-type scale ranging from 1 (never) to 5 (always). The parenting dimensions are calculated as the arithmetic mean of its items, and the parenting styles are the arithmetic mean of its dimensions. The score in all the dimensions and styles ranges from 1 to 5, with higher scores indicating more use of the dimensions or styles.

Child and Adolescent Behavior Inventory (CABI) — a parent report questionnaire developed to assess a wide range of behavioral problems in children and adolescents. Consists of 75 items on which parents had to report if the behavior was “very true”, “somewhat true”, and “not true”. The questionnaire investigates symptoms of anxiety (including generalized, separation, phobias, social, obsessive-compulsive, and self-confidence), depression, oppositional defiant disorder, conduct disorder, and attention deficit/hyperactivity disorder (ADHD). Also, the instrument assesses child’s evaluation of reality, social relationships, sphincter control, eating problems, sex, smoking, alcohol and substance abuse, school performance, and passive bullying. The instrument also allows assessment of broader groups of symptomatology, namely internalizing disorders, externalizing disorders, and ADHD. In this study all scales of the instrument were used, a total of 25 scales: Somatic, Anxiety, Phobias, Obsessive-compulsive Disorder (OCD), Insecurity, Post-traumatic Stress Disorder (PTSD), Depression, Irritability, Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), Impulsivity, Hyperactivity, Attention, Reality, Relationships, Enuresis/encopresis, Bulimia, Anorexia, Sex, Substance abuse, School, Bullism victim, Attention-Deficit/Hyperactivity Disorder (ADHD), Internalizing, and Externalizing. The ADHD scale results from the sum of Impulsivity, Hyperactivity, and Attention scores. The Internalizing scale is composed of the sum of Somatic, Anxiety, Phobia, OCD, Insecurity, PTSD, and Depression scores. Finally, the Externalizing scale results from the sum of Irritability, ODD, and CD scores. The original version presented good reliability, with Cronbach’s alpha index for the Internalizing Scale of 0.822 and for the Externalizing Scale of 0.800 (Chianchetti et al., 2013). The adapted Brazilian version is in development.

Game Addiction Scale (GAS) — the instrument evaluates internet and videogame addiction and consists of 21 items, representing the seven DSM criteria for game addiction: Salience, Tolerance, Mood modification, Withdrawal, Relapse, Conflict, and Problems (Lemos, Cardoso, & Sougey, 2016). Parents had to rate gaming behavior on a 5-likert scale, ranging from 1 (never) to 5 (very often). Therefore, higher scores indicate more problematic gaming. The instrument was translated and adapted to Brazilian Portuguese for the adolescent population, with good internal consistency (Cronbach’s alpha ranging from 0.55 to 0.92 among the seven criteria and 0.92 for the total items) (Lemmens, Valkenburg, & Peter, 2009). The adapted Brazilian version and its psychometric study for children is in development.

Sleep Disturbance Scale for Children (SDSC) — the parent report scale was developed as a standardized measure of sleep disturbance in children (Bruni et al., 1996). The scale consists of 26 items and 6 subscales: disorders of initiating and maintaining sleep, sleep-disordered breathing, disorders of arousal, sleep-wake transition disorders, disorders of excessive somnolence, and sleep hypohydrosis. The instrument was translated and adapted to Brazilian Portuguese and presented good consistency (Cronbach’s alpha ranging from 0.56 to 0.82 among subscales and 0.78 for the entire scale) (Ferreira et al., 2009).

2.6. Data analysis

Analyses were performed in SPSS 25.0. Descriptive statistics were calculated to assess sample characteristics. Variables were saved
| Variable                                      | N = 329                      |
|----------------------------------------------|------------------------------|
| **Parent**                                   |                              |
| Age (years, mean (SD) | Md)                        | 39.60 (9.73) | 40 |
| Sex (male, N (%))                        | 33 (10)                      |
| Weekly working hours (mean (SD) | Md)                  | 32.44 (16.74) | 40 |
| SES (mean (SD) | Md)                     | 36.95 (11.59) | 37 |
| Habitants in the house (mean (SD) | Md)                    | 3.62 (1.04) | 4 |
| Ethnicity (N (%))                          |                              |
| Yellow                                      | 10 (3.1)                     |
| White                                       | 199 (61.4)                   |
| Indigenous                                  | 1 (0.3)                      |
| Pardo                                       | 95 (29.3)                    |
| Black                                       | 19 (5.9)                     |
| Schooling (N (%))                           |                              |
| Illiterate/incomplete elementary school       | 6 (1.8)                      |
| Complete elementary school/incomplete middle school | 8 (2.4)                  |
| Complete middle school/incomplete high school | 10 (3.0)                   |
| Complete high school/incomplete undergraduation | 71 (21.6)                |
| Complete undergraduation                    | 191 (58.1)                   |
| Masters                                     | 31 (9.4)                     |
| PhD                                         | 12 (3.6)                     |
| Parents' relationship (N (%))               |                              |
| Married/common-law married                  | 233 (72.6)                   |
| Separated, with shared custody              | 23 (7.2)                     |
| Separated, with mother's custody            | 43 (13.4)                    |
| Separated, with father's custody            | 1 (0.3)                      |
| Single mother                               | 17 (5.3)                     |
| Deceased father                             | 3 (0.9)                      |
| Deceased mother                             | 1 (0.3)                      |
| Kinship (N (%))                             |                              |
| Biological mother                           | 275 (88.4)                   |
| Biological father                           | 23 (7.4)                     |
| Adoptive mother                             | 9 (2.9)                      |
| Adoptive father                             | 2 (0.6)                      |
| Stepmother                                  | 1 (0.3)                      |
| Stepfather                                  | 1 (0.3)                      |
| Daily time spent playing with the child (N (%) |                              |
| <1 h                                        | 210 (65.4)                   |
| 2 h                                         | 86 (26.8)                    |
| 3 h                                         | 16 (5.0)                     |
| >4 h                                        | 9 (2.8)                      |
| Covid-19 events (yes, N (%))                |                              |
| I was hospitalized for suspected or diagnosed COVID-19 | 11 (3.3)               |
| My child/adolescent was hospitalized for suspected or diagnosed COVID-19 | 2 (0.6)                  |
| A close family member or friend has died because of COVID-19 | 58 (17.6)                |
| I received financial aid from the government | 48 (14.6)                  |
| I received help from friends, neighbors or volunteers/organizations | 23 (7.0)                  |
| Social isolation has increased violence around me (home and/or neighborhood) | 20 (6.1)                  |
| I am a health professional and I work directly to face COVID-19 | 30 (9.1)                  |
| Are you in isolation? (N (%))               |                              |
| Yes                                         | 189 (57.6)                   |
| No                                          | 3 (0.9)                      |
| Partially                                   | 112 (34.1)                   |
| We were adopting isolation, but we are no longer, given the opening of activities in my city. | 24 (7.3)                  |
| Isolation duration (months, mean (SD) | Md)             | 4.04 (1.04) | 4.00 |
| Children                                    |                              |
| Age (years, Mean (SD) | Md)                   | 10.25 (4.55) | 9 |
| Sex (male, N (%))                           | 220 (66.9)                   |
| Ethnicity (N (%))                           |                              |
| Yellow                                      | 6 (1.8)                      |
| White                                       | 211 (64.5)                   |
| Indigenous                                  | 1 (0.3)                      |
| Pardo                                       | 93 (28.4)                    |
| Black                                       | 16 (4.9)                     |
| School type (public, N (%))                 |                              |
| 104 (32.2)                                  |                              |
| Schooling (years, mean (SD) | Md)                  | 5.11 (3.32) | 4 |
| Sleep Disturbance Scale for Children (SDSC) (mean (SD) | Md)           | 48.56 (15.12) | 45 |
| Screen time (per day) (N(%))                 |                              |
| Until 2 h                                   | 46 (14.2)                    |
| 2 to 4 h                                    | 113 (34.9)                   |
| 4 to 8 h                                    | 116 (35.8)                   |
| >8 h                                        | 49 (15.1)                    |

**Note:** SD = standard deviation; Md = median.
Table 2
Group differences.

| Variable                                      | Authoritative (N = 109) | Authoritarian (N = 107) | Control (N = 113) | Z/χ² | p   | Effect size
|-----------------------------------------------|-------------------------|-------------------------|-------------------|------|-----|-------------|
| **Parents**                                   |                         |                         |                   |      |     |             |
| Age years, mean (SD) | Md)***                  | 41.65 (8.48) | 35.97 (9.74) | 41.07 (9.97) | 28.965 | <0.000 | 0.08 |
| Sex (male, N (%))**                             |                         | 5 (4.6) | 16 (15) | 12 (10.6) | 6.496 | 0.039 | 0.14 |
| Weekly working hours (mean (SD) | Md)***               | 30.98 (16.64) | 33.66 (17.90) | 32.86 (15.78) | 4.214 | 0.122 | 0.00 |
| SES (mean (SD) | Md)***                  | 40.09 (10.42) | 33.15 (11.20) | 37.53 (12.09) | 20.752 | <0.000 | 0.05 |
| Number of house habitants (mean (SD) | Md)                      | 3.69 (0.96) | 3.60 (1.17) | 3.57 (0.99) | 0.801 | 0.670 | −0.01 |
| **Ethnicity (N (%))**                          |                         | 2 (1.8) | 5 (4.7) | 3 (2.8) | 7.203 | 0.515 | 0.11 |
| White                                         |                         | 75 (68.8) | 58 (54.7) | 66 (60.6) |                   |       |      |
| Indigenous                                    |                         | 0 | 1 (0.9) | 0 |                   |       |      |
| Pardo                                         |                         | 26 (23.9) | 35 (33) | 34 (31.2) |                   |       |      |
| Black                                         |                         | 6 (5.5) | 7 (6.6) | 6 (5.5) |                   |       |      |
| **Schooling (N (%))**)                         |                         | 1 (0.9) | 7 (6.5) | 1 (0.9) |                   |       |      |
| Complete elementary school/ incomplete middle school |                         | 19 (17.4) | 32 (29.9) | 20 (17.7) |                   |       |      |
| Complete middle school/ incomplete high school |                         | 68 (62.4) | 54 (50.5) | 69 (61.1) |                   |       |      |
| PhD                                           |                         | 5 (4.6) | 2 (1.9) | 5 (4.4) |                   |       |      |
| **Parents' relationship (N (%))**              |                         | 77 (71.3) | 75 (71.4) | 81 (75.0) | 7.807 | 0.800 | 0.16 |
| Married/common-law married                    |                         | 8 (7.4) | 9 (8.6) | 6 (5.6) |                   |       |      |
| Separated. with shared custody                |                         | 17 (15.7) | 14 (13.3) | 12 (11.1) |                   |       |      |
| Separated. with mother's custody              |                         | 0 | 1 (1.0) | 0 |                   |       |      |
| Separated. with father's custody              |                         | 5 (4.6) | 6 (5.7) | 6 (5.6) |                   |       |      |
| Single mother                                 |                         | 1 (0.9) | 0 | 2 (1.9) |                   |       |      |
| Deceased father                               |                         | 0 | 0 | 1 (0.9) |                   |       |      |
| Deceased mother                               |                         | 4 (3.7) | 1 (0.9) | 6 (5.3) | 3.309 | 0.191 | 0.10 |
| Covid events (yes, N (%))                     |                         | 2 (1.8) | 0 | 0 | 4.061 | 0.131 | 0.11 |
| I was hospitalized for suspected or diagnosed COVID-19 |                         | 16 (14.7) | 20 (18.7) | 22 (19.5) | 1.000 | 0.607 | 0.06 |
| My child/adolescent was hospitalized for suspected or diagnosed COVID-19 |                         | 14 (12.8) | 17 (15.9) | 17 (15.0) | 0.430 | 0.807 | 0.04 |
| A close family member or friend has died because of COVID-19 |                         | 4 (3.7) | 12 (11.2) | 7 (6.2) | 4.895 | 0.086 | 0.12 |
| I received financial aid from the government |                         | 3 (2.8) | 12 (11.2) | 5 (4.4) | 7.598 | 0.022 | 0.15 |
| I received help from friends. Neighbors or volunteers/ organizations |                         | 9 (8.3) | 10 (9.3) | 11 (9.7) | 0.156 | 0.925 | 0.02 |
| Social isolation has increased violence around me (home and/or neighborhood) |                         | 75 (68.8) | 52 (48.6) | 62 (55.4) | 12.513 | 0.051 | 0.20 |
| I am a health professional and I work directly to face COVID-19 |                         | 1 (0.9) | 1 (0.9) | 1 (0.9) |                   |       |      |
| **Are you in isolation? (N (%))**              |                         | 28 (25.7) | 41 (38.3) | 43 (38.4) |                   |       |      |
| Yes                                           |                         | 75 (68.8) | 52 (48.6) | 62 (55.4) | 12.513 | 0.051 | 0.20 |
| Partially                                     |                         | 1 (0.9) | 1 (0.9) | 1 (0.9) |                   |       |      |
| Period we were adopting isolation. But we are no longer. Given the opening of activities in my city. |                         | 5 (4.6) | 13 (12.1) | 6 (5.4) |                   |       |      |
| Isolation time (months, mean (SD) | Md)***                  | 4.03 (0.84) | 4.00 (1.17) | 4.08 (1.10) | 1.638 | 0.441 | −0.01 |
| Authoritative style PSDQ (mean (SD) | Md)***                  | 4.80 (0.10) | 3.74 (0.60) | 3.78 (0.71) | 218.687 | <0.000 | 0.66 |
| Warmth/support***                             |                         | 4.80 | 3.87 | 3.80 |                   |       |      |
| Regulation***                                 |                         | 4.80 | 4.00 | 4.00 |                   |       |      |
| Autonomy***                                   |                         | 4.60 | 3.40 | 3.60 |                   |       |      |
| Authoritarian style PSDQ (mean (SD) | Md)***                  | 1.69 (0.38) | 2.94 (0.40) | 1.68 (0.45) | 216.422 | <0.000 | 0.65 |

(continued on next page)
Table 2 (continued)

| Variable | Authoritative (N = 109) | Authoritarian (N = 107) | Control (N = 113) | Z/χ² | p | Effect size³ |
|----------|-------------------------|-------------------------|-------------------|-------|---|--------------|
| Physical coercion*** | 1.38 (0.48) | 2.61 (0.76) | 1.36 (0.46) | 156.285 | <0.000 | 0.47 |
| Verbal hostility*** | 2.13 (0.67) | 3.55 (0.54) | 2.09 (0.68) | 174.328 | <0.000 | 0.52 |
| Punishment*** | 1.56 (0.45) | 2.65 (0.57) | 1.58 (0.51) | 154.236 | <0.000 | 0.46 |

Children

| Age (years, mean (SD) | Md)*** | | | | | |
|-----------------------|--------|--------|--------|--------|--------|--------|
| 10.41 (4.41) | 9.22 (4.06) | 8.11 (4.98) | 9.346 | 0.009 | 0.02 |

| Ethnicity (N (%)) | | | | | | |
|-------------------|--------|--------|--------|--------|--------|--------|
| Yellow | 1 (0.9) | 3 (2.8) | 2 (1.8) | 4.474 | 0.12 |
| White | 73 (67.0) | 65 (60.7) | 73 (65.8) | |
| Indigenous | 0 | 0 | 1 (0.9) | | |
| Pardo | 30 (27.5) | 32 (29.9) | 31 (27.9) | | |
| Black | 5 (4.6) | 7 (6.5) | 4 (3.6) | | |

| School type (public, N (%)) | | | | | | |
|-------------------------------|--------|--------|--------|--------|--------|--------|
| 25 (23.4) | 41 (38.3) | 38 (34.9) | 6.015 | 0.049 | 0.14 |

| Sex (male, N (%)) | | | | | | |
|------------------|--------|--------|--------|--------|--------|--------|
| 69 (63.3) | 78 (72.9) | 73 (65.8) | 2.432 | 0.296 | 0.09 |

| Schooling (years, mean (SD) | Md) | | | | | |
|-------------------------------|--------|--------|--------|--------|--------|--------|
| 5.43 (3.26) | 4.46 (3.21) | 5.39 (3.43) | 5.902 | 0.052 | 0.01 |

| Screen time (N(%)) | | | | | | |
|-------------------|--------|--------|--------|--------|--------|--------|
| Until 2 h | 19 (17.6) | 10 (9.4) | 17 (15.5) | 6.628 | 0.357 | 0.14 |
| 2 to 4 h | 43 (39.8) | 34 (32.1) | 36 (32.7) | |
| 4 to 8 h | 32 (29.6) | 43 (40.6) | 41 (37.3) | |
| >8 h | 14 (13.0) | 19 (17.9) | 16 (14.5) | |

| Game Addiction Scale | Total score** | | | | | |
|----------------------|---------------|-----------|--------|--------|--------|--------|
| (mean (SD) | Md) | | | | | |
| -0.55 (0.09) | 0.27 (0.11) | -0.20 | 10.370 | 0.006 | 0.03 |

| Sleep Disturbance Scale (SDCS) (mean (SD) | Md) | | | | | |
|--------------------------------------------|--------|--------|--------|--------|--------|--------|
| 45.53 (14.34) | 54.93 (14.39) | 46.44 | 29.575 | <0.000 | 0.08 |

1 = correlation coefficient r (0.10 small, 0.30 average, 0.50 high).

* p ≤ 0.05.

** p ≤ 0.01.

*** p ≤ 0.00.
as standardized scores and missing data were replaced by the sample mean.

Kruskal-Wallis and Chi-Square tests were used to investigate if variable distribution was the same among Authoritative, Authoritarian, and Control groups. For effect size, we used epsilon-squared and Cramer’s V, which can be interpreted as $r$ (0.10 small, 0.30 medium, 0.50 large) (Kwak & Kim, 2017). Next, using the Enter method, Multiple Regression Analysis was used to test which parenting dimensions were significantly associated with game addiction, sleep disturbance, and behavior problems. Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern. In this association investigation, analyses were taken with the entire sample, considering that parenting was the independent variable. Dependent variables used were total scale scores, namely game addiction, sleep disturbance, internalizing behavior, externalizing behavior, and ADHD behavior problems. Analyses were controlled for parent's age, children's age, family socio-economic score, and screen time.

Considering that significant differences in children’s behavior, game usage, and sleep problems were found between groups, association analyses were executed between those characteristics and all six parenting domains (warmth and support, regulation, autonomy, physical coercion, verbal hostility, and punishment). In order to reduce the number of factors and avoid multicollinearity, only the three broader groups of CABI were used to analyze associations of parenting dimensions and behavior problems. Finally, all association models were controlled for parent's age, children's age, and socio-economic status, once those variables have shown significant difference between parenting groups. Screen time was also controlled due to its known impact on gaming behavior (Karaca, Karakoc, Can Gurkan, Onan, & Unsal Barlas, 2020).

### 3. Results

Overall, the final sample was composed of 329 parents (33 (10%) male) aged 20 to 65 years (mean 39.60, SD 9.73). Sample characteristics are shown on Table 1.

Briefly, results on differences between Authoritative and Authoritarian families, as shown on Table 2, indicate that Authoritative families have more children studying in private schools and report lower scores in internalizing behavior problems. Turning now to the Authoritarian group, the families have the youngest parents, lowest socioeconomic level, more parents with low schooling, the youngest children, highest scores on behavior problems, the highest scores on game addiction, and, finally, the highest scores on sleep disturbance. Interestingly, among COVID-19 related events, significant difference was only found on the perception of increased violence, with Authoritarian families reporting more frequently the perception of violence increase during the pandemic.

Regarding game addiction, sleep disturbance, and behavior problems, results mainly demonstrated significant differences between the authoritative and authoritarian groups, with more behavior problems being observed in the authoritarian group. Referring to game addiction, the authoritarian group had the highest scores when compared to both authoritative and control groups on total score and relapse ($Z = 10.370, p = 0.006$; $10.130, p = 0.006$ respectively), with a small effect size. Still on game addiction, the authoritarian group showed significantly more problems caused by excessive game play when compared to the authoritative group ($Z = 7.692, p = 0.021$), with a small effect size. Finally, about game play, the authoritarian group showed higher scores, also with small effect size, on withdrawal, conflict, salience, and tolerance when compared to the control group ($Z = 12.742, p = 0.002$; $Z = 13.405, p = 0.001$; $Z = 10.338, p = 0.006$; $Z = 11.124, p = 0.004$ respectively).

Concerning sleep disturbance, the authoritarian group showed significantly more problems than both authoritative and control groups in almost all dimensions, except in excessive somnolence where the difference appeared only with the authoritative group ($Z = 8.061, p = 0.018$).

About internalizing behavior, although with a small effect size, the authoritative group had significantly less problems compared to both authoritative and control groups ($Z = 23.441, p < 0.000$). The same pattern was observed for anxiety, post-traumatic stress disorder, depression, and relations scales alone. As concerned to externalizing and ADHD behavior, the authoritative group had significantly more problems compared with both authoritative and control groups, with a small effect size ($Z = 65.964, p < 0.000$; $Z = 51.486, p < 0.000$ respectively). The same pattern was observed for irritability, oppositional defiant disorder, impulsivity, hyperactivity, inattention, reality, and enuresis/encopresis scales alone.

On Table 3 models summary are presented and on Table 4 association coefficients are shown. Game addiction was significantly associated with regulation and punishment dimensions. Sleep disturbance was significantly associated only with verbal hostility. All behavior problems were significantly associated with autonomy, physical coercion, and verbal hostility, although only externalizing behavior associated with regulation. Interestingly, regulation was positively associated with game addiction and externalizing behavior, meaning that the use of more regulation strategies is related to increase in those behaviors.

### Table 3

Shared variance of children's game addiction, sleep disturbance, and behavioral problems with parenting dimensions [DC2].

|                          | $R^2$ | Adjusted $R^2$ | SE   | F     | df1 | df2 | Sig.  |
|--------------------------|-------|----------------|------|-------|-----|-----|-------|
| Game addiction           | 0.205 | 0.180          | 0.895| 4.906 | 6   | 310 | <0.001|
| Sleep disturbance         | 0.187 | 0.161          | 0.908| 5.544 | 6   | 310 | <0.001|
| Internalizing behavior    | 0.191 | 0.165          | 0.920| 5.043 | 6   | 310 | <0.001|
| Externalizing behavior    | 0.390 | 0.371          | 0.810| 16.477| 6   | 310 | <0.001|
| ADHD behavior             | 0.321 | 0.299          | 0.867| 10.518| 6   | 310 | <0.001|
Because of the school new scenario, some children kept having school classes based on a hybrid system with remote and online educational activities, and some were having episodic exercises and school classes made with television transmission. Previous studies have shown that the online school activities have been highly impacting in family's dynamic, increasing the exposition to family dynamics and the in-home relationships (Thorell et al., 2021). This increase in exposition might lead to an improved or declined family dynamics’ quality in a pandemic scenario. Therefore, in our study, we aimed to explore if there is a difference in children's behavior problems, game usage, and sleep disturbance according to the predominant parenting style in the household. Furthermore, we also aimed to explore which parenting strategies were associated with behavior problems, game usage, and sleep disturbance.

In the Brazilian pandemic scenario, considering health and economic critical conditions, there was a large amount of infected population with a frequent awareness of knowing or losing someone for the COVID-19, in addition to the huge economic burden with an extensive time of lockdowns and social distancing recommendations being ineffective, making the process long and stressful for all (Lancet, 2020). For these reasons we tried to understand the family dynamic and characteristics while they were living under such stress.

Parental stress is a known risk factor for hostile and less supportive parenting (Beckerman, van Berkel, Mesman, & Alink, 2017; Choi & Becher, 2019). It is proposed that harsh parenting comes in response to experienced distress, with parents displaying dysfunctional emotion-focused coping behaviors towards the child, behaviors that appear as yelling, insulting, threatening, and punishing (Le, Fredman, & Feinberg, 2017). In an intervention study, researchers found that parents experiencing burnout were more likely to be neglectful and abusive. On the other hand, there was a decrease in neglect and abuse when the intervention focused on reducing parental burnout (Brianda et al., 2020).

Firstly, Authoritarian parenting seemed to be a risk factor to mental disorders, more dysfunctional gaming, and sleep disorders. The Parental stress is a known risk factor for hostile and less supportive parenting (Beckerman, van Berkel, Mesman, & Alink, 2017; Choi & Becher, 2019). It is proposed that harsh parenting comes in response to experienced distress, with parents displaying dysfunctional emotion-focused coping behaviors towards the child, behaviors that appear as yelling, insulting, threatening, and punishing (Le, Fredman, & Feinberg, 2017). In an intervention study, researchers found that parents experiencing burnout were more likely to be neglectful and abusive. On the other hand, there was a decrease in neglect and abuse when the intervention focused on reducing parental burnout (Brianda et al., 2020).

Anyway literature is quite consistent about how impacting it is to have a parent using authoritarian or authoritative strategies (Coe, Davies, Hentges, & Sturge-Apple, 2020; Wood, McLeod, Sigman, Hwang, & Chu, 2003). The common ideal of parenting is marked by warmth and closeness between parent–child (Alonso-Stuyck, 2019). The parenting effect is quite variable from age, children
temperament, development staging, present diagnosis and others. Previously in a Chinese study, they identified that impulsivity symptoms mediated the relation of physical punishment to externalizing symptoms (Eisenberg, Chang, Ma, & Huang, 2009). In longitudinal studies, the loss of supportive parenting in unstable conditions was associated with emergence of externalizing symptoms in children (Coe et al., 2020). Here we observe a consistent negative effect of authoritarian parenting more evident in externalizing and ADHD symptoms. Among the strategies used in children and adolescents presenting externalizing and ADHD behavior, we observed a relationship with the report of less autonomy and more parental use of physical coercion and verbal hostility in order to control children's behavior.

Children and adolescents from authoritarian parents have higher scores of symptoms of gaming addiction, having a higher risk to present social and academic compromise (Siste et al., 2020). The parental use of regulation and punishment strategies were related to a high score of gaming addiction. Similarly, positive parenting seems to reduce severity of game addiction, as seen in a recent Chinese study, where parental warmth was associated with diminished risk for pathological internet use (Chen, Lee, Dong, Gamble, & Feng, 2020). Parental restriction rules for video game use seems to be an important factor in the relation between parenting and game usage.

In adolescents under authoritarian parenting, there is a report of feeling more stress (Fitziani, 2019). Insomnia and sleep quality mediates in adults the distress symptoms (Lin et al., 2021) and problematic social media use, showing a close relationship between sleep, screen use and mental health symptoms that deserves to be better investigated in studies with repeated measures. Sleep disorders might be indicative of psychiatric symptoms and these symptoms might persist through time (Hansen, Skirbekk, Oerbeck, Wentzel-Larsen, & Kristensen, 2013). In a recent study, researchers found that toddlers' sleep quality might be related to parental distress, indicating that sleep disturbances might decrease with strategies focused on parental stress control and paternal participation in the childcare (De Stasio, Boldrini, Ragni, & Gentile, 2020). Here a tendency of disrupted sleep patterns was also observed in children living with authoritarian parents, specially parents who use verbal hostility as main strategie of behavioral control, even the presence of enuresis is more frequent in these children. However, there is a need for further studies to understand how sleep was modified by parental styles and how important it is in populational evaluation.

The findings of this study must be seen in light of some limitations. Firstly, we have a sampling issue without any baseline data. Since our sample was collected during the pandemic times, we used the snowballing strategy. In this survey we reached a more educated population than the Brazilian standards and we have no previous data to say how the pandemic changed the habits, activities, and behaviors. The sampling issue might result from two points: we might have assessed people who have access to the internet, and we might have access to people that could worry about mental health and education in critical conditions. Brazil is a country marked by inequalities in internet access, so we had to observe this data under a careful evaluation and avoid generalization. Further on the sampling issue, the difference between sex of respondents (90% of mothers and 10% of fathers) is a limitation and should be addressed in future research. Another limitation is the information collection on children's behavior based on parents' report, once the perception of an external informant is based on the subject's and the rater's characteristics (Smith, 2007). Besides, in pandemic times, parents are working from home and, although staying more time at home, they are not available to monitor children's behavior and electronical usage. Furthermore, our children sample had a wide age range. When accessing behavior problems, it is known that agreement among informants decreases when the subject becomes older, with self-report reaching higher rates for internalizing problems in adolescence (van der Ende, Verhulst, & Tiemeier, 2012). This means that, specially for internalizing behavior problems, the adolescent self-report could bring a broader understanding of the pandemic's impact on the family household. Finally, on limitations, we also acknowledge the fact that only Authoritative and Authoritarian styles were investigated, which limits family's dynamics understanding by only two dimensions. Narrowing the parenting strategies investigated, we might overlook the impact and possible intervention targets related to the Permissive style, for example.

Parenting style has long term effects (Coe et al., 2020; Sandler, Ingram, Wolchik, Tein, & Winslow, 2015), unconsciously it seems to be transmitted to the next generation, evaluations are important since parental styles might be trained to be more adaptive. Here we describe our findings about the parental characteristics and effects on gaming, sleep and children behavior. It is the first of four waves, in the longitudinal follow up we may understand better the relationship of the gaming use, parenting styles, sleep and children's mental health under stressful conditions.

Children and adolescents might have an amplified impact during pandemic depending on the parenting strategies mostly used. Considering parental management training is an effective strategy to improve parenting strategies and it is available even online, it might consist of ground to have a potential improvement in developmental competencies and in children and adolescent's mental health even during pandemic times (Comer et al., 2017; Daley et al., 2018). It is still an alert: stressful and isolated conditions might amplify for good and for bad the parenting effects on children.

Finally, our results add to others reported in the literature and reinforce the importance of assessment and interventions aimed at parenting styles as a therapeutic target in child mental health. Future studies should evaluate intervention strategies in relation to best parent-child relationship practices.

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**Data statement**

The data is available under reasonable request to the corresponding author.
Werneck, A. O., Silva, D. R., Malta, D. C., Souza-Júnior, P. R. B., Azevedo, L. O., Barros, M. B. A., & Szwarcwald, C. L. (2021). Physical inactivity and elevated TV-viewing reported changes during the COVID-19 pandemic are associated with mental health: A survey with 43,995 Brazilian adults. *Journal of Psychosomatic Research, 140*, Article 110292. https://doi.org/10.1016/j.jpsychores.2020.110292

Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W.-C., & Chu, B. C. (2003). Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 44*(1), 134–151. https://doi.org/10.1111/1469-7610.00106

Wu, Q., & Xu, Y. (2020). Parenting stress and risk of child maltreatment during the (COVID-19) pandemic: A family stress theory-informed perspective. *Developmental Child Welfare, 2*(3), 180-196.