

Academic performance and intellectual capacity in school-age children after the COVID-19 pandemic in Colombia



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Background: The coronavirus disease 2019 pandemic caused prolonged school closures and a shift to virtual education, creating major challenges for children with limited internet access or digital skills. These difficulties disrupted learning, especially in key areas such as mathematics and language.

Aim: To examine the relationship between academic performance and intellectual capacity in children aged 6 years – 8 years after the pandemic.

Setting: The study took place at a public school in Pasto, Colombia.

Methods: A descriptive, cross-sectional study was conducted with 418 children. Cognitive performance was assessed using the WISC-IV, while academic and demographic data were obtained from *Sistema administrador de procesos educativos* [Educational Process Management System] (SAPRED).

Results: A high proportion of children scored in low-average (38%) and borderline (32%) ranges. Most showed borderline performance in verbal comprehension (77%) and working memory (78%). Significant correlations were found between WISC-IV scores and academic performance in mathematics and Spanish.

Conclusion: Intellectual and academic performance levels were mainly low or borderline, highlighting the influence of socioeconomic and environmental factors on post-pandemic learning.

Contribution: The study provides insight into post-pandemic cognitive and academic outcomes in Colombian children and emphasises the need for context-sensitive educational and psychological interventions.

Keywords: intellectual capacity; academic performance; pandemic; post-pandemic; language; mathematics.

Introduction

The COVID-19 pandemic created many challenges, especially in education, due to the closure of numerous schools (Alban Conto et al. 2021). This situation required major adjustments in learning methods during the lockdown period (Alban Conto et al. 2021; Cortés-Albornoz et al. 2023). However, this transition brought several difficulties. Many students lacked access to the electronic devices needed for remote education, while schools often had limited technical resources to provide quality virtual teaching. In addition, many parents or guardians struggled to use the platforms provided by schools (Chambonnière et al. 2021; Colvin, Reesman & Glen 2021), likely due to their limited knowledge of internet use and technology in educational settings (Cortés-Albornoz et al. 2023). The lack of personal communication and interaction also affected students' motivation and cognitive development (Cortés-Albornoz et al. 2023). Similarly, researchers (Chambonnière et al. 2021; Cortés-Albornoz et al. 2023) reported emotional problems among children (especially anxiety) during and after the pandemic, possibly linked to preventive measures implemented when schools reopened (Colvin et al. 2021).

Remote learning, introduced to prevent the spread of COVID-19, had a strong impact on children's education (Andrew et al. 2020). By the end of the school year, children were typically 4–5 months behind in reading and mathematics (Office for Civil Rights, U.S. Department of Education 2021; Sewell 2021). School closures worsened academic difficulties, particularly for socioeconomically

disadvantaged students (De Figueiredo et al. 2021). The concept of unfinished learning emerged to describe these educational delays, which deepened pre-existing inequalities (Bray et al. 2021).

One major challenge in assessing the global impact of the pandemic on learning is the lack of data. International comparative evaluations mostly cover middle- and high-income countries and were not conducted at the beginning of the crisis (Council of the Great City Schools 2020). As researchers analysed the educational cost of the pandemic, they increasingly used the term unfinished learning to refer to the delays caused by the health emergency (Bailey et al. 2021). Initial studies on the impact of school interruptions relied on simulation models, which projected stronger negative effects on younger children and those in low-income households (Fuchs-Schündeln et al. 2020). This situation widened the gap in academic performance, particularly in mathematics and language, among socioeconomic groups due to unequal access to technology and learning support (Kuhfeld et al. 2020a).

In Colombia, the return to in-person learning revealed that vulnerable populations such as those with low economic resources, living in rural areas, or with limited internet access faced significant challenges with virtual learning (Álvarez Leal, Arana Ochoa & Bayona Cruz 2022). Similar issues were observed globally, with about a third of students lacking the tools necessary for online education (Broca Olán, Morales Vázquez & Arias de la Cruz 2024). The restrictions during the health crisis notably impacted childhood development, particularly in language and communication skills (Pérez 2022). Although severe neurological consequences were not evident, the pandemic's mental health impact is undeniable (Pérez 2022).

Previous studies have found that people who experience a pandemic are at higher risk of developing psychological problems and cognitive deficits (Kuhfeld et al. 2020a).

Neurocognitive effects have increased after the COVID-19 lockdown, possibly due to the prolonged interruption of educational processes, socioeconomic deterioration during confinement and resulting mental health challenges (Colvin et al. 2021). In several cognitive test results, when compared with pre-pandemic normative data, current scores among children and adolescents with typical development appear lower than expected (Peng & Kievit 2020; Zheng 2023). Academic performance scores may be even more affected. The reason for this later phenomenon to occur relates to the two-way relationship between the acquisition of academic skills and the development of cognitive abilities (Peng & Kievit 2020).

Several studies (Kuhfeld et al. 2020b, 2022) identify intellectual capacity as a stable and highly relevant predictor of children's academic performance, together with other factors such as family, social and cultural context.

Thus, school performance can be understood as a complex construct that includes quantitative aspects, such as numerical tests, and qualitative dimensions related to skills, values and competencies (Kuhfeld et al. 2022). Different authors have linked academic achievement to individual cognitive processes, particularly intelligence, language, working memory and executive functioning (MacCann et al. 2020). Research exploring the relationship between intelligence and academic performance shows that intelligence is the most consistent and powerful predictor of school achievement. Meta-analytical evidence suggests that intelligence strongly influences new learning processes. However, the connection between intelligence and academic performance also reflects the effects of education and culture. Among cognitive domains, linguistic ability shows the strongest correlation with intellectual capacity (MacCann et al. 2020).

One possible explanation for the link between intellectual performance and learning skills is the influence of multiple brain mechanisms that shape both areas and create interconnections between them (Lozano-Blasco et al. 2022). Lower intellectual quotient levels are often associated with greater academic difficulties, more frequent cognitive processing errors and higher risks of school failure. Intelligence quotient scores indicate an individual's capacity to learn and, to some extent, represent accumulated knowledge (Kuhfeld et al. 2022). The COVID-19 pandemic brought significant impacts across all areas of life, particularly in education. Mandatory confinement forced changes in the teaching and learning process (Eróstabe-Pérez et al. 2022). These adjustments greatly affected children's academic performance and cognitive development (Lee 2024). However, the real impact of these changes after the pandemic remains uncertain (Kuhfeld et al. 2022). Therefore, the purpose of this study was to determine the relationship between the level of academic performance and intellectual capacity in a group of children aged 6–8 years, enrolled in a public school in Pasto, Colombia, after the COVID-19 pandemic.

Research methods and design

This descriptive, cross-sectional study was conducted in a public school in Pasto, Colombia. The study selected a non-random sample of 418 children aged 6, 7 and 8, from first to third grade, respectively. The study took place in 2021, after the COVID-19 lockdown, during the students' readjustment to in-person learning. The inclusion criteria were age, school enrolment and parental consent. This study assessed cognitive performance using the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) intelligence scale, which measures general intellectual abilities (verbal comprehension and perceptual reasoning) and cognitive processing skills (working memory and processing speed). These dimensions align with theories of fluid and crystallised intelligence. Two psychologists conducted the fieldwork for the intelligence test with support from two school counsellors. The sessions followed the school calendar and were conducted Monday to Friday, from 07:00 to 14:00, over approximately four consecutive months.

The study also analysed the relationship between sociodemographic characteristics and the students' average grades in Spanish and mathematics for 2022, obtained from the *Sistema administrador de procesos educativos* [Educational Process Management System] (SAPRED) system. Primary schools in Colombia often use management software to support their academic processes. This platform provides continuous access to school records, academic tracking, billing, enrolment and behavioural reports. It also allows the implementation of evaluation models based on competencies and achievements. Among the sociodemographic variables, socioeconomic stratification stood out. This classification system ranks residential properties by their access to public services.

The National Administrative Department of Statistics (DANE), Colombia's official statistical agency, defines these strata to help understand the country's economy, society and territory. The system identifies homes and neighbourhoods within a stratum category ranging from 0 to 5. High-income households receive the number 5 category. In this system, households with higher economic capacity pay more for public services, while lower strata receive subsidies. Stratum 0 includes homes with poor physical infrastructure, often made from temporary materials such as wood, canvas, cardboard or metal sheets, located on hillsides or near rivers, usually without access to basic services such as water, electricity or gas. Stratum 1 typically includes rented rooms with limited shared spaces. Stratum 2 consists of social housing built to provide a minimum standard of living, equipped with basic utilities. Stratum 3 generally includes owned homes and reflects greater financial stability among residents.

Statistical analysis

Data were analysed using Microsoft Excel 2013 for descriptive statistics (percentage, mean, standard deviation, etc.) and Statistical Package for Social Sciences (SPSS) version 19 (IBM Corp., Armonk, NY, US) for correlational analysis. Parametric statistics were applied to quantitative variables requiring the estimation of mean, median, mode and standard deviation.

Ethical considerations

The study was reviewed and approved by the Ethics, Bioethics and Scientific Integrity Committee of Universidad Mariana according to agreement number 224 on 17 September 2021; in addition, the research considered the recommendations of Resolution 8430 of 1993 of the Ministry of Health and with the Declaration of Helsinki of the World Medical Association.

Results

Table 1 shows that regarding gender, there was an equal proportion of male and female participants. The most common age group was 8 years old, representing 40.1% of

the sample. In terms of socioeconomic status, which reflects the income level and living conditions, most children belonged to strata 0 and 1, corresponding to lower-income groups that receive government subsidies. Concerning the type of housing, the majority of participants (89%) lived in rented homes, which aligns with their socioeconomic classification. Finally, an equal distribution of students was observed across the first and second grades.

Table 2 presents the composite scores and total intellectual ability scores from the WISC-IV test administered to the group of schoolchildren. The minimum and maximum values correspond to the total scores obtained by the children on the different subtests of the intelligence scale. According to the WISC-IV technical manual, the qualitative descriptions of the composite scores are interpreted as follows: Scores between (70 and 79) correspond to borderline performance; scores between (80 and 89) are interpreted as low-average performance. In this regard, the mean scores for the verbal comprehension and working memory subtests were (77.6), categorised as borderline.

TABLE 1: Sociodemographic characteristics of a group of school-aged children.

Dimension	Frequency	%
Gender		
Female	206	49.7
Male	212	50.3
Age (years)		
Six	130	32.1
Seven	180	40.1
Eight	108	27.9
Socioeconomic status (Stratum)		
Zero	172	41.1
One	178	42.6
Two	41	9.8
Three	27	6.5
Living with parents		
Yes	400	97.8
No	18	2.2
Type of housing		
Own	133	10.5
Rent	285	89.5
Grade		
First	172	38.5
Second	168	39.7
Third	78	21.8
Laterality		
Right-handed	400	88.2
Left-handed	18	11.8

TABLE 2: Composite indices and total intellectual capacity from the Wechsler Intelligence Scale for Children – Fourth Edition test in a group of schoolchildren and test of normality.

Variable	"	Minimum	Maximum	Mean	Kolmogorov-Smirnov test
Verbal comprehension	418	50	119	77.60	0.000
Perceptual reasoning	418	33	133	89.45	0.016
Working memory	418	50	126	77.60	0.000
Processing speed	418	18	126	89.25	0.000
Intellectual capacity (Total)	418	52	115	78.25	0.001

TABLE 3: Percentage by levels, composite indices and total intellectual capacity in a group of school-aged children.

Level	Verbal comprehension		Perceptual reasoning		Working memory		Processing speed		Intellectual capacity (Total)	
	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Extremely low	28	117	3.0	14	29.0	119	3	13	18.0	75
Bordering	34	142	17.0	72	27.0	113	15	61	38.0	159
Low average	22	91	28.0	117	24.0	102	34	140	32.0	135
Average	15	63	47.0	197	19.0	81	45	189	12.0	48
Average high	1	5	3.0	13	0.5	2	3	11	0.2	1
Superior	0	0	1.0	4	0.2	1	1	4	0.0	0
Far superior	0	0	0.2	1	0.0	0	0	0	0.0	0

TABLE 4: Descriptive statistics of academic performance by school children.

Subject	<i>n</i>	Minimal	Maximum	Media
Mathematics	418	2.25	5.0	3.8
Spanish	418	1.85	5.0	3.7

The mean scores for processing speed and perceptual reasoning were (89.4), corresponding to a low-average level. Finally, the total intellectual ability score was (78.2), also within the borderline range.

Table 3 shows that a significant proportion of the children assessed with the WISC-IV test scored within the borderline (38%) and low-average (32%) ranges. This outcome may be partly explained by the precarious sociodemographic conditions of participants.

Regarding academic performance (see Table 4) in mathematics and Spanish, average grades ranged from 3.7 to 3.8, with a maximum score of 5.0 and a minimum of 3.0. According to the school's grading system, the scores obtained in these subjects are interpreted as follows: an average between 1 and 2 is considered failing; 3–3.9 is considered acceptable or fair; 4–4.9 is considered good; and 5.0 or higher is considered outstanding. Furthermore, these academic performance scores are consistent with the composite indices and total intellectual ability scores obtained on the WISC-IV test.

The study used the Pearson correlation test (*r*) to determine the strength and direction of the linear relationship between scores on the cognitive scales and academic performance in mathematics and Spanish, since both variables – the intelligence quotient and the academic grades – are continuous. The obtained correlation coefficients are presented in Table 5. In mathematics, positive and statistically significant correlations were found for several variables: verbal comprehension ($r = 0.224$, $p < 0.01$), perceptual reasoning ($r = 0.321$, $p < 0.01$), working memory ($r = 0.104$, $p < 0.05$), processing speed ($r = 0.131$, $p < 0.01$) and total intellectual capacity ($r = 0.258$, $p < 0.01$).

Similarly, in Spanish, significant and positive correlations were observed between total intellectual capacity ($r = 0.272$, $p < 0.01$), verbal comprehension ($r = 0.204$, $p < 0.01$), working memory ($r = 0.167$, $p < 0.01$), perceptual reasoning ($r = 0.275$, $p < 0.01$) and processing speed ($r = 0.103$, $p < 0.05$). These findings indicate that academic performance in both subjects improves as cognitive performance increases, particularly in verbal comprehension and perceptual

TABLE 5: Pearson correlation between composite indices, total intellectual capacity (Wechsler Intelligence Scale for Children – Fourth Edition) and academic performance in the group of school-aged children.

Subject	Verbal comprehension	Perceptual reasoning	Working memory	Processing speed	Intellectual capacity (Total)
Mathematics	0.224**	0.321**	0.104*	0.131**	0.258**
Spanish	0.204**	0.275**	0.167**	0.103*	0.272**

*, The correlation is significant at the 0.05 level (two-tailed); **, The correlation is significant at the 0.01 level (two-tailed).

reasoning. The correlation strength ranges from low to moderate, suggesting that although intellectual capacity influences academic outcomes, it is not the only factor that explains performance differences.

In summary, applying Pearson's correlation test made it possible to identify significant and positive linear relationships between the evaluated cognitive dimensions and school grades, supporting the hypothesis that intellectual abilities play an important role in academic achievement in both mathematics and Spanish.

Discussion

This research aimed to explore the relationship between academic performance and intellectual capacity among schoolchildren in the post-pandemic period. Analysis of the WISC-IV test results showed that the children's total intelligence quotient (TIQ) averaged (78), which indicates borderline intellectual capacity. This range is often considered the threshold between normal intellectual functioning and mild intellectual disability (Erastabe-Pérez et al. 2022). The prevalence of borderline intellectual functioning is significant worldwide (Lee 2024); in Latin America, about 13.6% of schoolchildren and approximately 20% in Colombia fall within this range (Rodríguez-Pérez & Hernández 2025; Vanegas Agudelo, Moreno Zuleta & Villada Ochoa 2023). Studies attribute this situation to demographic factors, including economic hardship and low socioeconomic status (Lee 2024; Rodríguez-Pérez & Hernández 2025). In addition, limited pedagogical opportunities and unfavourable environmental conditions may also contribute to lower cognitive performance among some children (Vanegas Agudelo et al. 2023).

Similarly, borderline intellectual functioning remains underdiagnosed and poorly understood. Children within this category face a higher risk of academic failure and often require special educational support (Kim & Cheon 2024). Poverty further affects cognitive performance, especially the

intellectual component, which appears in a large proportion of children with borderline intelligence (Sätälä et al. 2022). According to these authors, the main causes include: (1) low socioeconomic status, particularly among students attending public schools from strata 1 and 2; (2) sociocultural deprivation and low parental education levels (Pulina et al. 2019); and (3) the lack of cognitive assessment tools adapted to this population, resulting in inaccurate evaluations (Sätälä et al. 2022). This issue has become a social concern, as about 50 million people with disabilities live in Latin America and the Caribbean (Miranda-Galarza 2021). One study found that 92.5% of individuals with borderline intellectual functioning lived in low-income status (Quílez-Robres et al. 2021). Another study reported that 45.9% met the criteria for borderline intelligence, while 16.1% scored even lower due to food insecurity and adverse socioeconomic conditions (Cortés Pascual, Moyano Muñoz & Quílez Robres 2019).

The evaluated population in this study mostly scored within the extremely low to borderline range on the verbal comprehension and working memory subtests of the WISC-IV. Some authors report that 31% of students struggle with verbal components, while 41% show difficulties in working memory processing (Cortés Pascual et al. 2019; Sätälä et al. 2022). These results are linked to both formal and informal early childhood education and to broader social issues, such as inequality and poor quality of life, which affect educational development (Miranda-Galarza 2021). The main cognitive challenges include linguistic difficulties, particularly in verbal expression and comprehension (Quílez-Robres et al. 2021). Other studies indicate that 60% of children with borderline intellectual functioning have language difficulties, especially in communication and comprehension (Stefanelli & Alloway 2020). Therefore, language skills and working memory processing are crucial predictors of cognitive capacity within the borderline range (Pulina et al. 2019; Stefanelli & Alloway 2020).

Children with borderline intellectual functioning frequently experience learning difficulties, low academic performance and school failure, particularly in mathematics and language (Stefanelli & Alloway 2020). There is general agreement that these children display deficits in verbal working memory, consistently observed across studies (Pulina et al. 2019). Such deficits contribute to problems in reading, writing and arithmetic due to limited comprehension and verbal fluency. Students with borderline intelligence usually achieve lower scores on tests measuring verbal ability and working memory (Sätälä et al. 2022; Vanegas Agudelo et al. 2023). These findings confirm earlier research showing that such students have difficulties in phonological and lexical processing and basic memory functions (Stefanelli & Alloway 2020). Particularly, poor verbal working memory may hinder tasks where language is essential for concept acquisition, following instructions, and developing learning skills (Quílez-Robres et al. 2021).

Some studies also point out that evidence is still limited regarding the real impact of the COVID-19 pandemic on

children's intellectual capacity (Breit et al. 2023; Hossain 2021). Several hypotheses emphasise the emotional factors, including anxiety and depressive symptoms, which were more frequent among schoolchildren in the post-pandemic period (Breit et al. 2023). Academic performance is therefore a reliable indicator of cognitive ability, as it reflects the mental skills students apply to acquire academic competences during their education (Boals & Banks 2020). The health crisis also reduced school attendance, which negatively affected academic performance and cognitive functioning (Hossain 2021). In primary education, cognitive performance was lower after the lockdown compared with pre-pandemic levels (Breit et al. 2023). These results can be explained by emotional distress, reduced instructional time and the use of virtual classes (Boals & Banks 2020).

Regarding academic performance, children achieved acceptable or moderate averages in mathematics and Spanish. This outcome is consistent with the borderline intellectual functioning level, as individuals within this cognitive range tend to have lower grades due to learning difficulties (Cortés Pascual et al. 2019), particularly those involving reading, writing, calculation and working memory (Pulina et al. 2019; Quílez-Robres et al. 2021). Thus, the lower the cognitive performance, the greater the academic and learning difficulties, as well as more frequent failures in cognitive processing and higher rates of school dropout (Quílez-Robres et al. 2021; Stefanelli & Alloway 2020). This situation is concerning, as 63% of children with borderline cognitive levels do not complete secondary school, and most report academic dissatisfaction (Sätälä et al. 2022). However, other factors also influence the relationship between cognitive capacity and school performance, including motivation, teaching and learning strategies, sociodemographic conditions, and – specifically in this case – the impact of the COVID-19 pandemic (Feng, Ioan & Li 2021).

Educational assessments have shown a negative impact on learning in mathematics and Spanish during the post-pandemic period, with stronger effects among Hispanic children and those from disadvantaged backgrounds (Cortés-Albornoz et al. 2023). This effect is attributed to unfinished learning resulting from the abrupt educational disruption in 2020 and the inadequate process of returning to in-person instruction after the pandemic (Angrist et al. 2021). Other studies confirm that standardised evaluations during and after the lockdown revealed specific academic difficulties in these key areas, which represent basic cognitive skills for intelligence (Angrist et al. 2021; Goldhaber et al. 2022). A possible causal explanation is academic anxiety, understood as the emotional distress experienced by children during and after school reopening following lockdowns is a key factor behind the cognitive problems for school-aged children during the pandemic (Cortés-Albornoz et al. 2023).

Scientific literature confirms lower performance in mathematics and Spanish before and after confinement in primary schools. These findings align with projections of

slower academic progress after school closures, estimating a delay of approximately 2.5 months. Specifically, in the language area, post-pandemic data revealed a decline of more than 3% in reading performance (Domingue et al. 2022). Other analyses on the impact of COVID-19 on reading patterns estimated that the variability in students' reading performance was 1.2 times higher than the normal standard deviation, with socioeconomic conditions playing a key role in these results (Cortés-Albornoz et al. 2023; Domingue et al. 2022).

This study provides relevant insights into the intellectual and academic performance of primary school children in a public school in Latin America in general and Colombia in particular. Intellectual capacity was evaluated in 418 students, and although the sample focused on a single school, the findings may serve as a reference for other educational contexts, especially since this is the first post-pandemic study conducted in the Department of Nariño, Colombia. The research examined academic performance in two key areas of the teaching-learning process: Mathematics and Spanish. The results may support the design of intervention strategies and the improvement of school re-engagement processes. However, some limitations of study must be acknowledged. Firstly, the results reflect only the reality of the studied population and, therefore, cannot be generalised. Secondly, the data lack normative scales adapted to the local context and do not include baseline evaluations that could provide a reference point at the time of school entry.

It is recommended that future research include other vulnerable groups, such as those in rural areas, indigenous communities and students with special educational needs. Further studies should also analyse sociodemographic variables, which have repeatedly been shown to be highly relevant in understanding learning processes in the post-pandemic context. Moreover, it is advisable to track the students who participated in this study to identify potential associations with other unexamined variables. Finally, it is important to consider flexible learning modalities and standardised tests to monitor children's academic performance, as these could help reduce educational inequalities. Providing psychological support is also essential to address the emotional and behavioural consequences of COVID-19 and to facilitate children's reintegration into regular learning routines.

Conclusion

To date, only a limited number of studies have examined the impact of COVID-19 lockdowns on academic performance and learning abilities in Colombia. This study found that the evaluated group of children displayed borderline intellectual capacity and acceptable average performance in mathematics and Spanish. These findings confirm the two-way relationship between the two analysed variables.

The sociodemographic characteristics of the schoolchildren were largely unfavourable, which increased the challenges related to both intellectual capacity and academic performance. These conditions have been repeatedly highlighted in previous research reports.

The acceptable performance in mathematics and Spanish underscores the importance of ensuring an effective teaching-learning process, as these subjects are fundamental to developing core cognitive abilities such as intelligence. This responsibility should not rest solely on teachers; families also play a crucial role in fostering and strengthening these capacities.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

CRediT authorship contribution

Yenny V. Paredes Arturo: Conceptualisation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. Laurin Rengifo: Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision, Validation, Visualisation, Writing – review & editing. Diego M. Díaz Velásquez: Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Supervision, Validation, Visualisation, Writing – original draft, Writing – review & editing. Nayibe M. Paredes Arturo: Conceptualisation, Formal analysis, Methodology, Project administration, Supervision, Visualisation, Writing – original draft, Writing – review & editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication, and take responsibility for the integrity of its findings.

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Data availability

The authors declare that all data that support this research article and findings are available in the article and its references.

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References

- Alban Conto, C., Akseer, S., Dreesen, T., Kamei, A., Mizunoya, S. & Rigole, A., 2021, 'Potential effects of COVID-19 school closures on foundational skills and country responses for mitigating learning loss', *International Journal of Educational Development* 87, 102434. <https://doi.org/10.1016/j.ijedudev.2021.102434>
- Álvarez Leal, A., Arana Ochoa, M. & Bayona Cruz, S., 2022, *Systematic review on the impact of virtual education on students in public schools in Bogotá due to the pandemic*, Cooperative University of Colombia, Faculty of Social Sciences, Psychology, Bogotá, viewed n.d., from <https://hdl.handle.net/20.500.1249/4/45030>.
- Andrew, A., Cattán, S., Costa Dias, M., Farquharson, C., Kraftman, L., Krutikova, S. et al., 2020, 'Inequalities in children's experiences of home learning during the COVID-19 lockdown in England', *Fiscal Studies* 41(3), 653–683. <https://doi.org/10.1111/1475-5890.12240>
- Angrist, N., De Barros, A., Bhula, R., Chakera, S., Cummskey, C., DeStefano, J. et al., 2021, 'Building back better to avert a learning catastrophe: Estimating learning loss from COVID-19 school shutdowns in Africa and facilitating short-term and long-term learning recovery', *International Journal of Educational Development* 84, 102437. <https://doi.org/10.1016/j.ijedudev.2021.102437>
- Bailey, D., Duncan, G., Murnane, R. & Yeung, N., 2021, 'Achievement gaps in the wake of COVID-19', *Educational Researcher* 50(5), 266–275. <https://doi.org/10.3102/0013189X211011237>
- Boals, A. & Banks, J.B., 2020, 'Estrés y funcionamiento cognitivo durante una pandemia: Reflexiones de investigadores del estrés' [Stress and cognitive functioning during a pandemic: Reflections from stress researchers], *Psychological Trauma: Theory, Research, Practice, and Policy* 12(S1), S255–S257. <https://doi.org/10.1037/tra0000716>
- Bray, A., Banks, J., Devitt, A. & Ní Chorcara, E., 2021, 'Connection before content: Using multiple perspectives to examine student engagement during COVID-19 school closures in Ireland', *Irish Educational Studies* 40(2), 431–441. <https://doi.org/10.1080/03323315.2021.1917444>
- Breit, M., Scherrer, V., Blickle, J. & Preckel, F., 2023, 'Students' intelligence test results after six and sixteen months of irregular schooling due to the COVID-19 pandemic', *PLoS One* 18(3), e0281779. <https://doi.org/10.1371/journal.pone.0281779>
- Broca Olán, F., Morales Vázquez, E. & Arias de la Cruz, A., 2024, 'Unfinished Learning: The Challenges of Remote Classes During Covid-19', *Ciencia Latina Revista Científica Multidisciplinar* 8(1), 9014–9028. https://doi.org/10.37811/cl_rcm.v8i1.10223
- Chambonnière, C., Fearnbach, N., Pelissier, L., Genin, P., Fillon, A., Boscaro, A. et al., 2021, 'Adverse collateral effects of COVID-19 public health restrictions on physical fitness and cognitive performance in primary school children', *International Journal of Environmental Research and Public Health* 18(21), 11099. <https://doi.org/10.3390/ijerph182111099>
- Colvin, M.K., Reesman, J. & Glen, T., 2021, 'El impacto de la interrupción educativa relacionada con la COVID-19 en niños y adolescentes: Resumen provisional de datos y comentario sobre diez consideraciones para la práctica neuropsicológica' [The impact of COVID-19-related educational disruption on children and adolescents: Interim data summary and commentary on ten considerations for neuropsychological practice], *The Clinical Neuropsychologist* 36(1), 45–71. <https://doi.org/10.1080/13854046.2021.1970230>
- Cortés Pascual, A., Moyano Muñoz, N. & Quílez Robres, A., 2019, 'Relationship between executive functions and academic performance in primary education: Review and meta-analysis', *Frontiers in Psychology* 10, 1582. <https://doi.org/10.3389/fpsyg.2019.01582>
- Cortés-Albornoz, M.C., Ramírez-Guerrero, S., García-Guáqueta, D.P., Vélez-Van-Meerbeke, A. & Talero-Gutiérrez, C., 2023, 'Effects of remote learning during COVID-19 lockdown on children's learning abilities and school performance: A systematic review', *International Journal of Educational Development* 101, 102835. <https://doi.org/10.1016/j.ijedudev.2023.102835>
- Council of the Great City Schools. (2020). *Addressing unfinished learning after COVID-19 school closures*, viewed n.d., from <https://files.eric.ed.gov/fulltext/ED615351.pdf>
- De Figueiredo, C.S., Sandre, P.C., Portugal, L., Mázala-de-Oliveira, T., Da Silva Chagas, L., Raony, I. et al., 2021, 'COVID-19 pandemic impact on children and adolescents' mental health: Biological, environmental, and social factors', *Progress in Neuro-Psychopharmacology and Biological Psychiatry* 106, 11071. <https://doi.org/10.1016/j.pnpbp.2020.11071>
- Domingue, B.W., Dell, M., Lang, D., Silverman, R., Yeatman, J. & Hough, H., 2022, 'The effect of COVID on oral reading fluency during the 2020–2021 academic year', *Educational Researcher* 51(8), 662–673. <https://doi.org/10.1177/23328584221120254>
- Erosta-Pérez, M., Reparaz-Abaitua, C., Martínez-Pérez, L. & Magallón-Recalde, I., 2022, 'Executive functions and their relationship with intellectual capacity and age in school children with intellectual disability', *Journal of Intellectual Disability Research* 66(1–2), 50–67. <https://doi.org/10.1111/jir.12885>
- Feng, X., Ioan, N. & Li, Y., 2021, 'Comparison of the effect of online teaching during COVID-19 and pre-pandemic traditional teaching in compulsory education', *The Journal of Educational Research* 114(4), 307–316. <https://doi.org/10.1080/00220671.2021.1930986>
- Fuchs-Schündeln, N., Krueger, D., Ludwig, A. & Popova, I., 2020, *The long-term distributional and welfare effects of COVID-19 school closures*, National Bureau of Economic Research working paper series 27773, viewed n.d., from <https://www.nber.org/papers/w27773>.
- Goldhaber, D., Kane, T.J., McEachin, A. & Morton, E., 2022, *A comprehensive picture of achievement across the COVID-19 pandemic years: Examining variation in test levels and growth across districts, schools, grades, and students*, CALDER working paper no. 266-0522.
- Hossain, M., 2021, 'Uneven experience of COVID-19-induced distance education in four developing countries', *International Journal of Educational Development* 85, 102446. <https://doi.org/10.1016/j.ijedudev.2021.102446>
- Kim, M. & Cheon, K.A., 2024, 'Exploring the clinical characteristics and comorbid disorders of borderline intellectual functioning', *Journal of the Korean Academy of Child and Adolescent Psychiatry* 35(3), 181–187. <https://doi.org/10.5765/jkacap.240012>
- Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E. & Liu, J., 2020a, 'Projecting the potential impact of COVID-19 school closures on academic achievement', *Educational Researcher* 49(8), 549–565. <https://doi.org/10.3102/0013189X20965918>
- Kuhfeld, M., Tarasawa, B., Johnson, A., Ruzek, E. & Lewis, K., 2020b, *Learning during COVID-19: Initial findings on students' reading and math achievement and growth*, NWEA research brief, viewed n.d., from <https://www.nwea.org/uploads/2020/11/Collaborative-brief-Learning-during-COVID-19.NOV2020.pdf>.
- Kuhfeld, M., Soland, J., Lewis, K., Ruzek, E. & Johnson, A., 2022, 'The COVID-19 school year: Learning and recovery across 2020–2021', *AERA Open* 8, 1–15. <https://doi.org/10.1177/23328584221099306>
- Lee, S.H., 2024, 'Treatment, education, and prognosis of slow learners (borderline intelligence)', *Journal of the Korean Academy of Child and Adolescent Psychiatry* 35(3), 192–196. <https://doi.org/10.5765/jkacap.240014>
- Lozano-Blasco, R., Quílez-Robres, A., Usán, P., Salavera, C. & Casanovas-López, R., 2022, 'Types of intelligence and academic performance: A systematic review and meta-analysis', *Journal of Intelligence* 10(4), 123. <https://doi.org/10.3390/jintelligence10040123>
- MacCann, C., Jiang, Y., Brown, L.E.R., Double, K.S., Bucich, M. & Minbashian, A., 2020, 'Emotional intelligence predicts academic performance: A meta-analysis', *Psychological Bulletin* 146(2), 150–186. <https://doi.org/10.1037/bul0000219>
- Miranda-Galarza, H.B., 2021, 'Intellectual disability: Demand for a critical cultural and social analysis in Ecuador', *Interstices. Sociological Journal of Critical Thinking* 14(2/2), 49–68, viewed n.d., from <https://intersticios.es/article/view/20706/13720>.
- Office for Civil Rights, U.S. Department of Education, 2021, *Education in a pandemic: The disparate impacts of COVID-19 on America's students*, TTAC Online, viewed n.d., from <https://files.eric.ed.gov/fulltext/ED619629.pdf>.
- Peng, P. & Kievit, R.A., 2020, 'The development of academic achievement and cognitive abilities: A bidirectional perspective', *Child Development Perspectives* 14(1), 15–20. <https://doi.org/10.1111/cdep.12352>
- Pérez, C., 2022, 'Unfinished learning in times of pandemic in childhood: The effects of Covid-19 on language development and emotional development', Degree Project, University of Valladolid, viewed n.d., from <https://uvadoc.uva.es/bitstream/handle/10324/56966/TFG-L3349.pdf?sequence=1&isAllowed=y>.
- Pulina, F., Lanfranchi, S., Henry, L. & Vianello, R., 2019, 'Intellectual profile in school-aged children with borderline intellectual functioning', *Research in Developmental Disabilities* 95, 103498. <https://doi.org/10.1016/j.ridd.2019.103498>
- Quílez-Robres, A., González-Andrade, A., Ortega, Z. & Santiago-Ramajo, S., 2021, 'Intelligence quotient, short-term memory and study habits as academic achievement predictors of elementary school: A follow-up study', *Studies in Educational Evaluation* 70, 101020. <https://doi.org/10.1016/j.stueduc.2021.101020>
- Rodríguez-Pérez, L. & Hernández, M., 2025, 'Understanding adaptive skills in borderline intellectual functioning: A systematic review', *European Journal of Investigation in Health, Psychology and Education* 15(3), 1–28. <https://doi.org/10.3390/ejihpe15030040>
- Sättilä, H., Jolma, L.M., Meriläinen-Nipuli, M. & Koivu-Jolma, M., 2022, 'Desafíos y funcionamiento neuropsicológico en niños y adolescentes con trastorno intelectual límite' [Challenges and neuropsychological functioning in children and adolescents with limited intellectual disorder], *Children* 9(12), 1847. <https://doi.org/10.3390/children9121847>
- Sewell, S., 2021, *Time out: The impact of COVID-19 on education*, Caribbean Policy Research Institute (CAPRI), viewed n.d., from <https://www.capricaribbean.org/document/time-out-impact-covid-education>.
- Stefanelli, S. & Alloway, T.P., 2020, 'Mathematical skills and working memory profile of children with borderline intellectual functioning', *Journal of Intellectual Disabilities* 24(3), 358–366. <https://doi.org/10.1177/1744629518821251>
- Vanegas Agudelo, J.F., Moreno Zuleta, N. & Villada Ochoa, O.A., 2023, 'Perfil neuropsicológico de niños con coeficiente intelectual límite y comorbilidad con trastornos de la conducta, emocionales y del neurodesarrollo' [Neuropsychological profile of children with limited IQ and comorbidity with behavioral, emotional, and neurodevelopmental disorders], *Revista Iberoamericana de Neuropsicología/ Ibero-American Journal of Neuropsychology* 6(1), 38–51.
- Zheng, H., 2023, '“The pandemic helped me!” Queer international students' identity negotiation with family on social media in immobile times', *International Journal of Cultural Studies* 26(6), 714–731.