In Executive Function COVID-19 Lockdown Timing Tied to Changes

A recent study investigated how the COVID-19 pandemic was associated with differences in the developmental trajectory of executive function among preschool children. Children who were preschool-aged when COVID-19 lockdowns began showed different patterns of cognitive growth in young children, with outcomes linked to maternal education.

Study

Executive function (EF) encompasses cognitive processes that underlie self-regulation, flexible adaptation, and sustained attention. As a supervisory system, EF coordinates core skills such as working memory, inhibitory control, and cognitive flexibility. Interest in EF has grown due to its strong associations with academic success, occupational and social outcomes, and overall well-being.

To harness these benefits, understanding EF's early developmental trajectory is essential, as this knowledge guides the design of impactful interventions. Achieving effective early assessment and intervention, however, depends on the availability of age-appropriate measurement tools and longitudinal approaches, and progress is limited by persistent methodological challenges in clarifying how EF develops in early childhood.

The rapid pace of early childhood development means that EF assessment tools must be frequently adapted. Tasks such as the A-not-B measure are useful in infancy but quickly become inadequate, and their limited longitudinal stability complicates long-term tracking of individual differences. Longitudinal studies often use different EF tasks at different ages, making it difficult to compare results and establish developmental continuity. Variability in task demands and the involvement of different cognitive components further complicate interpretation across time points.

Moreover, as EF and its foundational components develop together, it is challenging to disentangle whether developmental changes reflect growth in core processes or in their coordination by higher-level executive systems. Integrative tasks, such as the Dimensional Change Card Sort (DCCS), which require children to switch rules and engage multiple executive domains, offer a promising way to address these limitations as language skills develop.

Although empirical findings from the DCCS and its digital adaptations reveal rapid EF improvements between ages 3 and 5, inconsistent measurement across studies continues to

limit inferences about the stability of individual differences over time. However, when the same task is used consistently, such as the DCCS across multiple age points, greater longitudinal stability in EF has been observed, suggesting that consistent measurement is key for tracking developmental trajectories.

Findings

This study assessed the stability of early EF differences by repeatedly administering the DCCS and the tablet-based Minnesota Executive Function Scale (MEFS) to children aged 2.5 to 6.5 years. It also investigated the influence of maternal education as a key socioeconomic indicator, and whether the timing of assessments relative to the COVID-19 pandemic was associated with these developmental patterns.

The study also examined whether children's age at the onset of the COVID-19 pandemic was associated with differences in their EF trajectories. Specifically, it compared younger (preschool) and older (early primary school) children across multiple assessments to determine whether these groups differed in their association with pandemic-related disruptions. EF was measured at 30 months before the pandemic and again at 78 months, with some children also assessed at intermediate ages, allowing for analysis of how the interval since the initial lockdown impacted the stability of individual differences in EF.

The sample comprised 139 children (71 girls) from Norwich, UK. On average, mothers had a Bachelor's degree, and the average family income was £40,646. Children with vision problems, color blindness risk, or early brain trauma were excluded. The study received ethical approval from NHS England.

The study described children's experiences during COVID-19 and lockdowns. About 40 % of the cohort had no formal childcare, 52 % attended some form of childcare, and 60 % had experienced COVID-19 at least once. Children who were older when the pandemic began reported COVID-19 infection somewhat more often, although the association was weak and only marginally significant. The most common activities were spending time outdoors, talking with adults, and reading, while watching TV, structured play, and video gaming were less frequent.

The time since the COVID-19 lockdown was associated with the stability of children's EF between ages 30 and 78 months. Children whose mothers had higher education generally had higher EF scores and showed a more consistent relationship between early and later EF scores, whereas children whose mothers had lower education showed a relationship that varied depending on how long after the lockdown the later assessment occurred.

A key finding was that the relationship between EF at 30 and 78 months was weaker for children tested soon after the COVID-19 lockdown but stronger for those tested three to four years later. This suggests that the pandemic may have temporarily disrupted the stability of individual differences in EF measured across early childhood, which lessened over time. It highlights the importance of monitoring and supporting children's cognitive development in the years following significant disruptions, such as a pandemic.

The current study examined whether COVID-19 timing was related to group differences in EF growth trajectories. This analysis included age at COVID onset as a predictor in the group EF growth model, with 57 participants.

Children's initial EF was not associated with age at the onset of COVID, but younger children at the pandemic's onset showed faster improvement over time. In this sample, children who were preschool-aged at the time of the first lockdown showed steeper EF growth trajectories than those already in the first year of primary school. The study does not establish the causes of this difference, but the authors suggest it may relate to differences in schooling disruption, social experiences, or illness exposure during the pandemic, as well as the possibility that stronger early EF skills may buffer children against environmental disruptions.

Conclusion

Children's EF skills remain generally stable from 30 to 78 months of age, but the COVID-19 pandemic was associated with a temporary weakening of this stability, especially in the years following the lockdown. Maternal education consistently correlated with children's EF levels, with children of more highly educated mothers tending to have higher scores and more consistent relationships between early and later EF measurements.

Notably, preschool-aged children in this sample demonstrated faster improvement in EF after the lockdown compared to those in primary school, suggesting that age at disruption and changes in social experiences may both play a role in developmental trajectories following major societal disruptions. These findings highlight the importance of ongoing support for children's cognitive development following major disruptions.

Source:

https://www.news-medical.net/news/20260306/COVID-19-lockdown-timing-tied-to-changes-in-executive-function.aspx