

# Every Break You Take: Advancing Seasonal Comparison Research with Digital Trace Data

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## *Abstract*

Studies relying on seasonal variation in learning rates across school years and summer breaks have provided valuable insights into questions regarding the role of schools in generating inequality in academic achievement in general (Alexander, Entwisle, and Olson 2007; Downey, Von Hippel, and Broh 2004). The general conclusion from studies based on seasonal comparison designs seems to be that students experience substantial loss in cognitive skills during summer breaks and that achievement gaps grow during summer breaks and shrink or remain constant during school years (Downey 2023) – indicating that schools lower inequality in cognitive skills. However, recent studies suggest that these findings do not replicate reliably when relying on different data sources employing different cognitive tests (Workman, Von Hippel, and Merry 2023).

In the present study, we address questions regarding learning losses and schools' role in inequality in academic achievement, drawing on intensive longitudinal digital trace data from a reading app to measure weekly growth in reading speed of a cohort of Danish students starting in 4<sup>th</sup> grade in fall 2019 and followed to summer 2022 - merged with register information on student socioeconomic status (SES) and immigration status. We exploit variation in reading speed growth according to when school is in and out (e.g. holidays) - including episodes with Covid-19 school closings. We employ linear piecewise growth models, with reading speed as the outcome, measured at weekly intervals. We interact SES and immigration status with time segments to test for differences in reading speed growth according to periods when students are in school or out of school (holidays and Covid-19-induced school closings).

Our findings suggest that students gained reading speed during school but summer breaks and even one-week breaks, were associated with stagnation or regression in reading speed. Growth stagnated during and immediately after the initial school closing of spring 2020, but grew at a pace similar to normal schooling in the second and longer school closing of winter 20/21. In terms of SES and immigration inequality, there is no clear seasonal pattern but achievement gaps narrow according to both SES and immigration status, tend to decrease from 4<sup>th</sup> to 6<sup>th</sup> grade and mostly during periods of school.

## References

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