

Title: The Effect of Poverty on Cognitive Performance: a Systematic Review and Meta-analysis of the Causal Evidence

1. Short abstract (max 200 words)

Evidence suggests that living in financial scarcity creates traps for the poor by taxing their cognitive functioning. However, prior studies testing the causal impact of poverty on cognitive performance found contradictory results. To resolve these inconsistencies, provide a more accurate estimate on the size of the effect, and explore when and on which population it emerge, we conducted a systematic review and meta-analysis. At the end of the multi-stage selection procedure, we identified 8 empirical articles with 23 observations. Our results revealed that financial scarcity has a moderate negative influence on cognitive performance. The effect is considerably smaller than the first experimental studies have suggested, but the overall picture provides support for the notion that money scarcity has a causal negative effect on cognitive performance. However, despite the fact that the topic has attracted a wide policy and academic interest, there is still only a small number of quasi(experimental) studies completed, and we could not test the effect of the moderators leaving questions open for future research.

2. Long abstract (max 700 words)

Evidence suggests that living in financial scarcity creates traps for the poor by triggering counterproductive behavioral patterns which reinforce their poverty. Cognitive functioning is discussed as one major pathway through which such poverty traps are expressed. According to this view, poverty is a powerful context (Dean, Schilbach, and Schofield 2017) which negatively impacts people's cognitive performance. The impaired cognitive functioning can repercuss the chances to escape poverty through various channels such as schooling, deteriorated job performance, or altered risk preference. In the present systematic review, we focus on one part of this cycle: to what extent poverty, defined as financial scarcity, impacts cognitive performance?

Studies on the relationship between poverty and cognitive performance have a long history, but (quasi)experiments that allow researchers to better identify the variables and to establish the causality of the effects has only started in the last decade. These studies show contradictory results, suggesting that unaddressed contextual factors may moderate the prevalence of the effect.

With the purpose of resolving the inconsistencies in the literature, we conducted a systematic review and meta-analysis. Furthermore, to develop more nuanced theories on when and to what extent poverty deteriorates cognitive performance and gain an increased understanding on the generalizability of the effect, we aimed to explore the effect of potential moderating factors.

We only considered original empirical studies published in English language, where the authors aimed to capture the causal effect of poverty on cognitive functions by systematically manipulating or by capturing the systematic variance of the available money for the study participants. Such categorization could include (but was not exclusive to) randomized control trials, and payday variation or instrumental variable-based designs. That way, we only included studies, where the difference of cognitive performance could be calculated between a more financially scarce vs. less financially scarce situations. The dependent variable had to be measured with an assessment tool aiming to capture at least one of the following broad categories: memory, attention, executive functions (shifting / inhibition, inhibitory control, cognitive control / monitoring), and higher order intelligence.

We applied a two-step screening procedure on the identified studies. First, the title and the abstract of each candidate paper were screened by one team member. Second, only the studies which passed this first filtering were examined based on the full text by at least two of team members to select the relevant papers. We identified 28,044 entries in the three academic databases and the four databases covering grey literature. 27,925 articles were excluded based on the initial screening of the abstracts and the titles. 659 duplicates were also removed. The remaining 24 articles were downloaded

from which 16 entries were excluded based on the predetermined criteria. Studies were also added based on expert suggestions. The final list of included studies contained the 23 effect sizes, from 8 research articles.

The studies included in the meta-analysis differed along several dimensions such as the study design, population, context or the dependent variables, which made it challenging to draw conclusions on which differences explain the variance of the observed effect sizes.

As we assumed that beyond the variability coming from the sampling procedure, the treatment effect was varied also due to differences in the treatments (specifics of the study design and the population), we used a Bayesian random effects model with maximum likelihood estimator method to calculate our meta-analytic estimations. As we had individual observations and observations that came from multiple dependent variables from the same study, we applied a nested random effect model. We tested the robustness of our results by rerunning the analysis with wider and narrower priors. We also evaluated publication bias utilising a Bayesian selection model approach.

Our results showed that financial scarcity has a moderate negative influence on cognitive performance. This effect is considerably smaller than the first experimental studies have suggested, but the overall picture provides support for the notion that money scarcity has a causal negative effect on cognitive performance. Although the topic has attracted a wide policy and academic interest, there is still only a small number of quasi(experimental) studies completed which leaves many questions open for future research endeavors.