

Chess Training and Skills Development for Primary School Students in Bangladesh

Sector(s): Education

Location: Khulna and Satkhira districts, Southwest Bangladesh

Sample: 569 students

Research Papers: The Effects of Chess Instruction on Academic and Non-cognitive Outcomes: Field ...

Partner organization(s): Directorate of Primary Education, Global Development & Research Initiative (GDRI) Foundation, Monash University, Deakin University

Parents, teachers, and education institutions around the world frequently invest in chess training for their students, but little rigorous research has found a positive impact of chess on children's cognitive outcomes. Researchers in rural Bangladesh introduced a thirty-hour chess training program for grade 5 students to evaluate the impact of chess training on cognitive and non-cognitive outcomes, such as math scores, risk taking, patience, attention, and creativity. While the chess program had an unclear effect on math performance, it significantly reduced risk aversion, or the tendency to avoid taking risks, among participants.

Policy issue

Developing cognitive and non-cognitive skills in children is crucial for individual and societal success, as numerous studies have shown that cognitive skills improve academic performance while non-cognitive skills can impact a range of important life outcomes including drug use, truancy, teen pregnancy, crime, and labor market success. Many teachers, parents, and administrators may have the perception that learning chess strategy can improve academic performance, particularly in math, while others may believe that chess can make children more strategic, patient, or focused. In part due to this perception, national and local governments in countries including Armenia, Poland, and Germany have made chess instruction a mandatory part of the primary school curriculum. In the setting of grade 5 in rural Bangladesh, can several weeks of chess lessons improve cognitive or non-cognitive measures of learning?

Context of the evaluation

Rural Bangladeshi schools typically exhibit high levels of both teacher and student absenteeism. In a school week spanning six days, over 25 percent of children aged 7 to 14 years old were absent from school for at least one day.¹ Additionally, a decade prior to intervention, researchers reported that on any particular school day 16 percent of teachers were not present, and during two school visits 24 percent of teachers were absent at least once.² Rural primary schools also start later in the day than the official start time, as the first few hours of the school day are filled with unstructured play activities, as opposed to traditional academic studies. Due to issues of both absenteeism and late start times, rural Bangladeshi students receive relatively few effective instructional hours per day.

The children in this intervention predominately came from socio-economically disadvantaged households in rural Bangladesh. The parents of about one-third of the children never completed a primary school education, and fewer than 14 percent of families

had a member who received education beyond grade 10. The majority of household breadwinners worked in agriculture or day labor, while around 30 percent worked in small business activities, which tend to be low-paying professions. On average, households in these rural communities earned 8,500 takas (US\$110) per month, which is about 50 percent below the national average income of 16,000 takas per month in 2016.³

Students in this context generally had little or no prior experience playing chess, nor many other toys and cognitive games common in high-income countries including board games, computer games, mobile devices, or Legos. Out of the 569 children who completed the pre-program baseline diagnostic test, only one child was able to accurately answer three questions about the fundamental principles of chess (as compared to approximately 50 percent of children reporting previous chess experience in the average urban higher-income country context).⁴



Two fifth grade boys practice chess with each other outside their lessons in southwest Bangladesh.

Asad Islam | PI photo

Details of the intervention

Researchers conducted a randomized evaluation to test the impact of chess training on cognitive and non-cognitive student outcomes in Khulna and Satkhira, two rural districts in Southwest Bangladesh.

From the more than 200 schools in these rural districts, researchers randomly selected sixteen primary schools for the intervention. In these schools, researchers implemented a twelve-day chess training program over a three-week period in January and February 2016, the beginning of the academic year in Bangladesh. The sessions were held during school hours, but in the beginning of the day during unstructured time, so that the sessions did not interfere with the later academic instruction to the extent possible.

Each chess instruction session had two components: introducing students to the basic rules and strategies of the game, and supervising practice games with their peers. Students received instruction from experienced chess teachers recruited by the researchers and certified by the National Chess Federation in Bangladesh. These coaches used the lesson plans from free instructional chess materials developed specifically for primary school from the Chess in Schools Commission of the World Chess Federation (FIDE).

Researchers measured outcomes immediately before and after the intervention, and then nine to ten months later conducted follow-up assessments after leaving the chessboards with students to continue playing after the training ended.

Before the start of the intervention, researchers conducted baseline assessments of students' prior chess knowledge, personality traits, and math reasoning. Immediately after the intervention, researchers gave another exam to students on math reasoning and problem-solving. Researchers also monitored students' scores on the Primary School Certificate Examination, a national standardized test which students took nine to ten months after the intervention that assessed math, students' first-language, and science.

Researchers measured non-cognitive outcomes through a series of tasks, games, and tests. Researchers observed student risk preferences and time preferences, also known as patience, both immediately and nine to ten months after the intervention. They also measured creativity immediately after the program, and they measured focus nine to ten months post-intervention. To measure risk preferences, researchers presented students with a choice in a set of progressively riskier lotteries. For example, with a coin flip a student could earn four pieces of candy no matter what in the first lottery, compared to the riskiest lottery in which a student could invest four pieces of candy and a coin flip determined if their candy tripled or the student lost all their candy.

Results and policy lessons

intervention, while only having a modest effect on math scores. The program had no measurable impact on patience, attention, or creativity measures. Notably, students' feedback on the program was very positive, and chess engagement with peers continued for months after their initial training sessions.

Program Engagement: Approximately nine out of ten students continued to play and practice chess nine to ten months after the intensive three-week course. Students also expressed high interest in the short term after the program. During Week One, 95 percent of children said they played or discussed chess with at least one classmate outside the chess program, and that percentage remained high (88 percent) after Week Two.

Non-cognitive Outcomes: The program had no impact on creativity, attention, and focus, but it did significantly reduce risk aversion among students who were exposed to chess. These students were more likely to pick into lotteries with higher risk and higher reward than their peers in the comparison group. This suggests that chess training may help students recognize opportunities for calculated risk-taking and contribute to their skill development.

The study initially classified students into low, medium, and high-risk groups and found that 53 percent of students exposed to chess shifted from the lowest to the highest risk taking group, whereas only 11 percent did so among those not exposed to chess. Meanwhile, risk aversion actually increased among students not exposed to chess, with 74 percent exiting the highest risk category over time, suggesting chess training could dampen and even reverse naturally developing risk aversion.

Regarding time preferences, researchers did not find any effect of the chess program on students' patience.

Cognitive Outcomes: The chess training program did not improve students' cognitive performance as measured by the project-administered math test, but it did improve standardized exam scores nine to ten months later by the equivalent of approximately half a letter grade. However, this result was highly contingent on researchers' analysis methodology, and was not significant under all methodologies used.

On the whole, these results indicate that chess training can have modest effects on cognitive outcomes and a significant effect on risk preferences. By decreasing children's risk aversion and increasing their understanding of calculated risk, chess training programs might have the potential to equip students to make better decisions in their adolescence and potentially even beyond school when they join the labor force. Further research is needed to explore the mechanisms underlying the effects of chess training on risk preferences and to validate these findings in different contexts.

Islam, Asad, Wang-Sheng Lee, and Aaron Nicholas. 2021. "The Effects of Chess Instruction on Academic and Non-cognitive Outcomes: Field Experimental Evidence from a Developing Country." *Journal of Development Economics*, 150:102615. <https://doi.org/10.1016/j.jdeveco.2020.102615>

1. Kumar, Alok and Najmus Saqib. "School Absenteeism and Child Labor in Rural Bangladesh." *The Journal of Developing Areas* 51, no. 3 (2017): 299-316. doi:10.1353/jda.2017.0074.
2. Chaudhury, Nazmul, Jeffrey Hammer, Michael Kremer, Karthik Muralidharan, and F. Halsey Rogers. 2006. "Missing in Action: Teacher and Health Worker Absence in Developing Countries." *Journal of Economic Perspectives*, 20 (1): 91-116. DOI: 10.1257/089533006776526058
3. Bangladesh Bureau of Statistics, "Bangladesh HIES: Household Income Per Month (1996 - 2016)," CEIC Data, 2016, <https://www.ceicdata.com/en/bangladesh/household-income-and-expenditure-survey-average-monthly-income-per-household-by-income-group/hies-household-income-per-month>.
4. Jerrim, John, Lindsey Macmillan, John Micklewright, Mary Sawtell, and Meg Wiggins. "Chess in Schools: Evaluation Report and Executive Summary." Education Endowment Foundation, University College, London, UK. (2016).