



Chicago Chess Foundation

# Comparison of Chess and Non-Chess Students in Existing Chess Research

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The Game of Chess is not merely an idle amusement; several very valuable qualities of the mind, useful in the course of human life, are to be acquired and strengthened by it, so as to become habits ready on all occasions; for life is a kind of Chess...

(The Morals of Chess, Benjamin Franklin)

Much has been written over the past fifty years in academic literature and mainstream publications about the benefits of chess for children. A Google search on “benefits of chess” yields more than sixteen million results. We have gathered and summarized the major academic research below, which is overwhelmingly positive. We have added a few of our favorite articles.

Some studies describe the difficulty of generating accurate data because many scholastic chess players are self-selected and because it is difficult to identify an acceptable control group. In addition, some of the studies are of relatively small numbers of subjects. Overall, however, the sheer number of studies with positive results leaves little doubt about the benefits of chess.

This summary is in five parts. First, we present in Table form some of the study results which researchers found of statistical significance. Second, we list major studies and collections of studies and quote from some of their summaries. Third, we report results from a survey of teachers about what they consider to be the benefits of chess. Fourth is a short list of recommended articles from mainstream media. We conclude with an explanation of “why chess works” from the nation’s best-known chess researcher.

## THE TABLE

The Table below summarizes findings from the studies which found results of statistical significance. The research techniques employed in the studies were varied and complex. Most involved regression analyses and other statistical techniques designed to accurately identify correlations between variables. Results were measured and reported in many ways, including percentage increases in test scores, percentages of students meeting or exceeding state standards

or national performance averages, absolute increases in scores on particular exams, and the number of standard deviations one study group was ahead of another. Some included anecdotal evidence, which, while also supporting the benefits of chess, is excluded from the Table.

To avoid overcomplicating the Table, we include numbers only when they represent percentage differences in test scores when chess players and non-chess players are compared. Asterisks are used to note significant statistical differences measured in other ways. We have clustered similar attributes in some columns to avoid making the Table unwieldy.

### **Comparison of Chess and Non-Chess Students in Existing Chess Research**

Numbers denote percentages chess students were ahead  
Asterisks denote statistically significant differences not measured in percentages

Location, year published	Math test scores	Reading test scores	Attendance	Behavior, respect for others	Self-confidence, empathy, mood management, frustration tolerance	Critical thinking, problem solving, understanding consequences	Creativity, originality (3 measures)
<a href="#">Bradford, PA 1983</a>					*	13	14, 13, 35
<a href="#">New York, 1992</a> and <a href="#">1999</a>		*		42	*		
<a href="#">Houston (suburban), 1997</a>		*			*	*	*
<a href="#">Portland, 2006</a>	*	*		*	*	*	*
<a href="#">Philadelphia, 2009</a> and <a href="#">2010</a>	25	38	*	*			
<a href="#">Review of 24 studies, 2014</a>	*					*	

## **THE STUDIES AND FINDINGS**

**[New York, 1999](#)**: “The Effect of Chess on Reading Scores” (Margulies and Speeth, 1999)<sup>2</sup> (“Students in a New York City chess program improved reading scores more than a control group... Chessplayers outperformed the average student in the country and the average student in the district. The gains made by chessplayers were statistically significant...the chances are only one in a hundred that these gains were due to chance.”)

**[The Kitsis study, 2000](#)**: “Benefits of Chess for Academic Performance and Creative Thinking” (Aleksandr Kitsis, 2000) (“studies...support the contention that exposure to chess enhances memory, boosts spatial and numerical skills, increases problem-solving capabilities, and strengthens logical thinking.”)<sup>3</sup>

**The Dauvergne compilation, 2000:** “The Case for Chess as a Tool to Develop Our Children’s Minds” (Peter Dauvergne, 2000)<sup>4</sup> (“The case, then, is exceptionally strong for using chess to develop our children’s minds and help them cope with the growing complexities and demands of a globalising world. More and more schools around the world are recognising the value of chess, with instruction now becoming part of standard curriculums.”)

**Portland, 2006:** “Chess for Success Evaluation – Final Report, Submitted to the Office of Juvenile Justice and Delinquency Program, U.S. Department of Justice from the Northwest Regional Educational Laboratory” (Kim Yap, 2006).<sup>5</sup> Three-year study of 61 schools showed “positive long-term effect on assessment scores.”

**Philadelphia, 2009** and **2010:** “An Evaluation of the Chess Challenge Program of ASAP/After School Activities Partnerships” (Joseph Ducette, Temple University, 2009).<sup>6,7</sup> (“The results showed that the ASAP students outperformed the matched comparison group in both reading and math on the PSSA tests. In addition, the ASAP students had significantly fewer absences during the school year and, when compared to the Philadelphia student population as a whole, had significantly better behavior ratings. Additional analyses showed that students who had participated in the chess program for more than one year showed concomitant improvement in math and reading. Finally, students in the ASAP program gained more in reading and math from the previous school year as compared to the matched comparison group. Overall, the data indicate strong support for the Chess Challenge Program in improving the achievement and behavior of students.”)

**Illinois Chess Association, 2010:** What we have learned from the first 40 years of research: “The Value of Chess”<sup>8</sup>

**2014 meta-study:** “Literature Review of Chess Studies,” Basis Policy Research, Anna Nicotera and David Stuit (reviewed 24 studies)<sup>9</sup> (“After-school chess programs had a positive and statistically significant impact on mathematics outcomes and in-school chess interventions had a positive and statistically significant impact on mathematics and cognitive outcomes.”)

**2017 meta-study:** “A Meta-Analysis of the Available Evidence” (Sala and Gobet, 2017) (examines 24 studies).<sup>10</sup> (“The meta-analysis...shows that chess does seem to enhance primary and middle school students' achievement in mathematics...and overall cognitive ability...” (but) “almost none of the reviewed studies compared chess-treated groups with active control groups to rule out possible placebo effects. At present, this is the most serious methodological issue in the field.”)

**St. Louis collection:** One of the best research collections is on the website of the highly-regarded Chess Club and Scholastic Center of St. Louis Chess Club. 25 studies from the U.S. and abroad are listed and summarized.<sup>11</sup>

[Chess.com](#) recently listed studies and compilations, including one from the U.S. Chess Federation, adding that “(t)here's so many research studies about chess, the game now has its own scholarly printing, the "*Journal of Chess Research*.”<sup>12</sup>

## THE NEW YORK TEACHER SURVEY

### What New York Teachers Say Chess Does for Kids

Over the years, the chess program in New York City has taught half a million students how to play chess.

These are the percentages of teachers saying that chess has...

...developed their students' <b>problem-solving</b> skills	93%
...improved students' <b>analytic and logical reasoning</b> skills	92%
...increased their students' <b>self-esteem</b>	89%
...enriched their students' <b>social skills</b>	89%
...enhanced their students' <b>cooperation</b> skills	91%
...had a <b>meaningful positive impact</b> on their students	96%

(Source: <http://bit.ly/2nX68f5>)

## FROM THE MAINSTREAM PRESS

**Time Magazine:** “Check Mates” (2001) (Quoting chess coach Bruce Pandolfini: “[Chess would never have lasted] without the deep satisfaction it can deliver. If you find something you're good in, it explodes across your whole life. You feel that if you're good at one thing, you can be good at almost anything.”)

**New York Times:** “Chess, the Game of Royalty, Is Now the Game of Grade Schoolers, Too” (Dylan Loeb McClain, 2005) [considered by many the nation's top chess writer]<sup>13</sup>

**USA Today:** “Chess making comeback in U.S. schools” (2009) (tracks growth of chess nationwide)<sup>14</sup>

**Wall Street Journal:** “Chess, as a Survival Skill...School Uses Chess to Teach Self-Control, Critical Thinking to Troubled Students” (Stephanie Banchemo, 2010)<sup>15</sup>

**New York Times:** “Good at Chess? A Hedge Fund May Want to Hire You” 2011 article by (McClain, 2011)<sup>16</sup>

[New York Times](#): “Maybe Teach Them Math, Science and Chess” (James Warren, 2011)<sup>17</sup>

[Wall Street Journal](#): “Why NYC Kids Rule the Chess World” (2011)<sup>18</sup>

[Pacific Standard Magazine](#): “Why Chess Should be Required In U.S. Schools” (2013) (“It’s a game that motivates us to win, but also teaches us how to deal with defeat.”)<sup>19</sup>

[Education Week](#): “The Case for Chess” (2014)<sup>20</sup> (“Learning chess increases academic achievement.”)

[SAS \(education blog\)](#): “Scholastic chess clubs: 10 reasons why” (SAS, 2014) (includes links to studies)<sup>21</sup>

## **CONCLUSION: WHY CHESS WORKS**

Robert Ferguson, a pioneer in chess research, posed a key question in his seminal [“The Use and Impact of Chess”](#) (1997):

Why does chess have [such a positive] impact? Briefly, there appear to be at least seven significant factors:

- 1) Chess accommodates all modality strengths.
- 2) Chess provides a far greater quantity of problems for practice.
- 3) Chess offers immediate punishments and rewards for problem solving.
- 4) Chess creates a pattern or thinking system that, when used faithfully, breeds success. The chessplaying students had become accustomed to looking for more and different alternatives, which resulted in higher scores in fluency and originality.
- 5) Competition. Competition fosters interest, promotes mental alertness, challenges all students, and elicits the highest levels of achievement...
- 6) A learning environment organized around games has a positive effect on students’ attitudes toward learning. This... facilitate(s)... cognitive achievement... Instructional gaming is one of the most motivational tools in the good teacher’s repertoire. Children love games. Chess motivates them to become willing problem solvers and spend hours quietly immersed in logical thinking. These same young people often cannot sit still for fifteen minutes in the traditional classroom.
- 7) Chess supplies a variety and quality of problems... The problems that arise in the 70-90 positions of the average chess game are... new. Contexts are familiar, themes

repeat, but game positions never do. This makes chess good grist for the problem-solving mill.

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<sup>1</sup> Prepared by Jerry Neugarten, CCF Board Vice President

<sup>2</sup> <http://files.givewell.org/files/Analysis/margulies.pdf>

<sup>3</sup> [https://drive.google.com/file/d/18a3KeH1xd5V\\_2g6\\_xgjSxFNompbhZHM0/view?usp=sharing](https://drive.google.com/file/d/18a3KeH1xd5V_2g6_xgjSxFNompbhZHM0/view?usp=sharing)

<sup>4</sup> <http://www.auschess.org.au/articles/chessmind.htm>

<sup>5</sup>

<https://www.chessforsuccess.org/sites/default/files/Chess%20for%20Success%20Final%20Evaluation%20Report%2010-31-06.pdf>

<sup>6</sup> [https://saintlouischessclub.org/sites/default/files/DUCETTE\\_2009\\_EVALUATION.pdf](https://saintlouischessclub.org/sites/default/files/DUCETTE_2009_EVALUATION.pdf)

<sup>7</sup> <https://drive.google.com/file/d/1ICNypnQX0S49fBFF9GxncjZACm4p74By/view?usp=sharing>

<sup>8</sup> <http://www.il-chess.org/the-value-of-chess/234-the-value-of-chess>

<sup>9</sup> <http://bit.ly/2stRjFP>

<sup>10</sup> <https://www.frontiersin.org/articles/10.3389/fpsyg.2017.00238/full#B11>

<sup>11</sup> <https://saintlouischessclub.org/education/research>

<sup>12</sup> <https://www.chess.com/article/view/compilation-of-chess-and-education-research-studies>

<sup>13</sup> <http://www.nytimes.com/2005/10/05/crosswords/chess/chess-the-game-of-royalty-is-now-the-game-of-grade.html>

<sup>14</sup> [https://usatoday30.usatoday.com/news/education/2009-05-14-chess-in-schools\\_N.htm](https://usatoday30.usatoday.com/news/education/2009-05-14-chess-in-schools_N.htm)

<sup>15</sup> <https://drive.google.com/file/d/1xocTgdY10y4GpUC3VUeFB3o0n26aRHDd/view?usp=sharing>

<sup>16</sup> <https://dealbook.nytimes.com/2011/09/29/good-at-chess-a-hedge-fund-may-want-to-hire-you/?ref=dylanloebmcclain>

<sup>17</sup> <http://www.nytimes.com/2011/10/16/us/chess-tournament-in-chicago-teaches-discipline.html>

<sup>18</sup> <https://drive.google.com/file/d/1NucjRfUa-9yTR00NtdKwn5qqH5QE2s31/view?usp=sharing>

<sup>19</sup> <https://psmag.com/education/why-chess-should-be-required-in-us-schools-55241>

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<sup>20</sup> [http://blogs.edweek.org/teachers/teaching\\_for\\_triumph/2014/03/the\\_case\\_for\\_chess.html?cmp=ENL-EU-NEWS3](http://blogs.edweek.org/teachers/teaching_for_triumph/2014/03/the_case_for_chess.html?cmp=ENL-EU-NEWS3)

<sup>21</sup> <https://blogs.sas.com/content/sascom/2014/08/29/scholastic-chess-clubs-10-reasons-why/>