WWC Single Study Review

A review of the design and summary of findings for an individual study

ies INSTITUTE OF EDUCATION SCIENCES

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WWC Review of the Report "A Randomized Trial Examining the Effects of Aerobic Physical Activity on Attention-Deficit/ Hyperactivity Disorder Symptoms in Young Children"[1,2]

The findings from this review do not reflect the full body of research evidence on physical activity programs.

What is this study about?

The study examined the effect of a daily before-school physical activity program on behavioral outcomes of students in grades K–2 in two small US cities. The physical activity intervention was designed to improve symptoms associated with attention deficit hyperactivity disorder (ADHD).

The study sample included 202 students who either were identified as at risk for ADHD or showed typical development. The study authors randomly assigned students to receive either the physical activity intervention or a sedentary classroom-based program. The study authors then altered the random assignment of students by switching the students with the lowest and highest body mass index (BMI) in order to have more similar research groups. The authors analyzed the student data based on the altered assignments to condition.

Both the physical activity and sedentary classroom-based programs were conducted daily for 31 minutes before school for 12 weeks. Students receiving the physical activity intervention played games involving continuous activity, while students in the sedentary classroom-based comparison condition worked on art activities.

The study authors assessed the effects of the physical activity program relative to the sedentary program separately for students identified as at risk for ADHD and students showing typical development. Within each ADHD risk status group, the authors compared outcomes of the students in the intervention group with outcomes of the students in the comparison group. As noted earlier, all analyses were conducted on the altered groups and not the original randomly assigned groups. Outcome measures included parent and teacher assessments of student behavior.[3]

WWC Rating

The research described in this report does not meet WWC group design standards

The study authors altered the initial random assignment of a deliberately selected group of students to improve the similarity of the intervention and comparison groups in terms of BMI. The authors then analyzed the student data based on the altered research condition.[4] The analysis also included imputed outcomes for students with missing data.

Because randomization was compromised, the study could not meet group design WWC standards without reservations. In addition, the study was required to demonstrate baseline equivalence of the analytic samples without imputed outcomes to meet WWC group design standards with reservations. The study did not demonstrate baseline equivalence of an analytic sample without imputed outcomes, so the study does not meet WWC group design standards. Therefore, the findings from the study are not presented in this WWC report.

What did the study find?

None of the analyses presented in this study meet WWC group design standards, and therefore, the study findings are not presented in this WWC report.

Features of Physical Activity Program

Students participated in the physical activity (PA) program for 31 minutes each day before school over the course of 12 weeks in the winter and spring. The program involved three components in each school day: (1) a 2-minute large-group activity, (2) three 9-minute small-group stations, and (3) another 2-minute large-group activity. The activities included games that involved continuous movement, like tag. The PA intervention was intended to ameliorate the symptoms of ADHD—and benefit typically developing children—by improving cognitive function.

Endnotes

[1] Hoza, B., Smith, A. L., Shoulberg, E. K., Linnea, K. S., Dorsch, T. E., Blazo, J. A., Alerding, C. M., & McCabe, G. P. (2014). A randomized trial examining the effects of aerobic physical activity on attention-deficit/hyperactivity disorder symptoms in young children. *Journal of Abnormal Child Psychology.* doi:10.1007/s10802-014-9929-y

[2] Single study reviews examine evidence published in a study (supplemented, if necessary, by information obtained directly from the authors) to assess whether the study design meets WWC group design standards. The review reports the WWC's assessment of whether the study meets WWC group design standards and summarizes the study findings following WWC conventions for reporting evidence on effectiveness. This study was reviewed using the single study review protocol, version 2.0. A quick review of this study was released in November 2014, and this report is the follow-up review that replaces that initial assessment. The WWC rating applies only to the study outcomes that were eligible for review under this topic area. The reported analyses in this SSR are only for those eligible outcomes that either met WWC design standards without reservations or met WWC design standards with reservations, and do not necessarily apply to all results presented in the study.

[3] This WWC review focused on five outcome measures from both teacher and parent reports: hyperactive/impulsive symptoms, inattention symptoms, oppositional symptoms, moodiness, and peer behavior. There were five additional outcomes included in the study that are not described in this WWC report because they are not considered to be directly related to student achievement: peer reputation as measured by both parents and teachers, student-level intervention participation rate, aerobic capacity, and an indicator for whether any medication was used to treat symptoms of ADHD.

[4] Because the initial random assignment is deliberately altered and the analysis is based on the altered assignments, the intervention and comparison groups are not formed entirely by a random process. Comparison group designs where the assignment is not completely random are therefore required to demonstrate baseline equivalence to be rated meets WWC group design standards with reservations.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2015, May). *WWC review of the report: A randomized trial examining the effects of aerobic physical activity on attention-deficit/hyperactivity disorder symptoms in young children.* Retrieved from http://whatworks.ed.gov

Glossary of Terms

Attrition Attrition occurs when an outcome variable is not available for all participants initially assigned to the intervention and comparison groups. The WWC considers the total attrition rate and the difference in attrition rates across groups within a study.

Clustering adjustment If intervention assignment is made at a cluster level and the analysis is conducted at the student level, the WWC will adjust the statistical significance to account for this mismatch, if necessary.

Confounding factor A confounding factor is a component of a study that is completely aligned with one of the study conditions, making it impossible to separate how much of the observed effect was due to the intervention and how much was due to the factor.

Design The design of a study is the method by which intervention and comparison groups were assigned.

Domain A domain is a group of closely related outcomes.

Effect size The effect size is a measure of the magnitude of an effect. The WWC uses a standardized measure to facilitate comparisons across studies and outcomes.

Eligibility A study is eligible for review if it falls within the scope of the review protocol and uses either an experimental or matched comparison group design.

Equivalence A demonstration that the analytic sample groups are similar on observed characteristics defined in the review area protocol.

Improvement index Along a percentile distribution of individuals, the improvement index represents the gain or loss of the average individual due to the intervention. As the average individual starts at the 50th percentile, the measure ranges from –50 to +50.

Multiple comparison adjustment When a study includes multiple outcomes or comparison groups, the WWC will adjust the statistical significance to account for the multiple comparisons, if necessary.

Quasi-experimental design (QED) A quasi-experimental design (QED) is a research design in which study participants are assigned to intervention and comparison groups through a process that is not random.

Randomized controlled trial (RCT) A randomized controlled trial (RCT) is an experiment in which eligible study participants are randomly assigned to intervention and comparison groups.

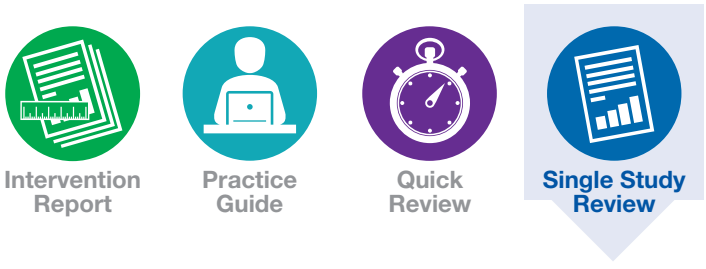
Single-case design (SCD) A research approach in which an outcome variable is measured repeatedly within and across different conditions that are defined by the presence or absence of an intervention.

Standard deviation The standard deviation of a measure shows how much variation exists across observations in the sample. A low standard deviation indicates that the observations in the sample tend to be very close to the mean; a high standard deviation indicates that the observations in the sample are spread out over a large range of values.

Statistical significance Statistical significance is the probability that the difference between groups is a result of chance rather than a real difference between the groups. The WWC labels a finding statistically significant if the likelihood that the difference is due to chance is less than 5% ($p < .05$).

Substantively important A substantively important finding is one that has an effect size of 0.25 or greater, regardless of statistical significance.

Please see the WWC Procedures and Standards Handbook (version 3.0) for additional details.



A **single study review** of an individual study includes the WWC's assessment of the quality of the research design and technical details about the study's design and findings.