



WWC Single Study Review

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



January 2016

WWC Review of the Report “Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence”¹

The findings from this review do not reflect the full body of research evidence on shaping theories of intelligence.

What is this study about?

The study evaluated an intervention to reduce stereotype threat. Stereotype threat is the harmful impact that knowledge of negative stereotypes about a group can have on an individual from that group. In this intervention, undergraduate college students participated in the distance mentoring of fictitious pen pals. Students in the intervention condition were asked to write encouraging letters to fictitious middle school students from disadvantaged backgrounds. The researchers provided intervention group participants with information about the *malleability of intelligence*, i.e., that intelligence can be improved through the application of effort instead of being a fixed, unchanging trait. The researchers asked the college students to share this information with their pen pals. By writing these encouraging letters, the researchers expected intervention participants, especially Blacks, to experience attitude change about their own intelligence and come to view their own intelligence as a capacity that can be changed with effort.

A total of 109 undergraduate students were recruited for the study. Thirty-seven students were randomly assigned to the “malleable intelligence” pen pal intervention, and 72 students were assigned to one of the two comparison conditions, which are combined for this report.²

The intervention group participants attended three laboratory sessions during the winter quarter in

January and February. In the first two sessions, they wrote letters to fictitious middle school students who were described as educationally at risk. The intervention group instructions included information about the malleability of intelligence; the group was also shown a video to reinforce the message. In the third session, the participants used their letters to write a speech, which was then videotaped. In one comparison condition, students participated in the same pen pal mentoring activities over three sessions, but they were asked to share information about intelligence as being composed of multiple different talents rather than a single entity. In the second comparison condition, participants received no intervention; these students completed measures about attitudes and beliefs and signed grade-release forms like the students in the other two groups.

The study evaluated the impact of the intervention on students’ academic achievement by obtaining grade point averages (GPAs) from the spring quarter following the intervention from the university registrar.³

WWC Rating

The research described in this report meets WWC group design standards without reservations

This study is a well-executed randomized controlled trial with low attrition.

What did the study find?

Study authors reported that students in the intervention group had higher spring quarter GPAs than the combined comparison groups (3.46 vs. 3.19). The WWC confirmed that this difference is statistically significant.

The study authors hypothesized that the intervention would be more effective for Black students because of their greater likelihood of experiencing stereotype threat. Stereotype threat is described by the authors as an extra challenge faced by Black students because of stereotypes about their abilities. To test this hypothesis, study authors also examined the effects of the intervention for Black and White students separately. However, these comparisons did not meet WWC group design standards because the authors did not have information on subgroup attrition; these results are not discussed here.

Features of Malleable Intelligence Pen Pals

Under the guise of encouraging younger, at-risk middle school students from impoverished communities to overcome the difficulties they face in order to achieve academic success, college students learn about the malleability of intelligence, as opposed to the idea of intelligence as a fixed ability. Participants then communicate and elaborate on this point for the benefit of the younger students by writing to them as academic pen pals, while internalizing the message through repetition and developing the message into a speech. The study authors describe the malleability of intelligence as a perspective that is used to overcome the psychological threat that can persist from racial stereotypes of African-American intellectual abilities.

Appendix A: Study details

Aronson, J., Fried, C. B., & Good, C. (2001). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38*, 113–125. doi:10.1006/jesp.2001.1491

Setting Stanford University undergraduates were recruited to take part in a study designed to study the impact of attitude change techniques on attitude and grade point average. The study was conducted in a laboratory setting at the university.

Study sample The study recruited 109 undergraduate students for pay to participate in the study. Due to a variety of reasons, from time constraints to unwillingness to share their grades, the final analysis sample included 79 participants. The participants were described as both male and female, with 42 being Black and 37 White.

Intervention group The intervention began in mid-January. The entire intervention consisted of three 1-hour laboratory sessions, spaced approximately 10 days apart, and was completed by late February. Sessions were comprised of two to five students and were racially mixed when possible. Participants in the intervention condition were asked to write encouraging letters to fictitious middle school students from disadvantaged backgrounds. The researchers provided intervention group participants with information about the malleability of intelligence and asked the participants to share this information with their fake pen pals. Participants were expected to internalize the message through repetition and by developing the message into a videotaped speech. By writing these encouraging letters and producing the speech about the malleability of intelligence, the researchers expected the intervention participants to experience attitude change about their own intelligence. Researchers expected intervention participants to report improved academic orientation, less stereotype threat, and evidence of improved grades as a result of the expected attitude change.

Comparison group In one comparison condition, students participated in the same contrived pen pal mentoring activities over three sessions, but were presented with a different underlying message about intelligence, focusing on it being composed of multiple different talents rather than a single entity. In the second comparison condition, participants received no intervention; these students completed measures about attitudes and beliefs and signed grade-release forms, as did the students in the other two groups. This single study review combines the two comparison groups into a single group. See Endnote 2 for more information.

Outcomes and measurement The study assessed the effect of the intervention on academic achievement as measured by students' grade point averages in the spring quarter following the intervention. The authors also examined five outcomes related to participants' belief in malleable intelligence (short-term and long-term), perceptions of stereotype threat, and attitudes toward academics (enjoyment of academics and belief that academics are important). None of these outcomes were eligible for review under the Postsecondary Education review protocol. For a more detailed description of this outcome measure, see Appendix B.

Reason for review Several federal grant funding programs require that funding applications be supported by evidence of effectiveness based on WWC standards. This study was identified for review by the WWC because it was cited by multiple grant applicants.

Appendix B: Outcome measure for the academic achievement domain

Academic achievement

<i>Grade point average (GPA)</i>	The students' spring quarter GPAs were obtained from the university registrar.
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Table Notes: The authors also examined five outcomes related to participants' belief in malleable intelligence (short-term and long-term), perceptions of stereotype threat, and attitudes toward academics (enjoyment of academics and belief that academics are important). None of these outcomes were eligible for review under the Postsecondary Education review protocol.

Appendix C: Study findings for the academic achievement domain

Domain and outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Academic achievement								
<i>Grade point average</i>	Full	79 students	3.46 (0.30)	3.19 (0.29)	0.27	0.91	+32	< .001
Domain average for academic achievement						0.91	+32	Statistically significant

Table Notes: For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. The statistical significance of the study's domain average was determined by the WWC. Some statistics may not sum as expected due to rounding.

Study Notes: The data presented in this table were obtained from the authors' response to a data request from the WWC. The p-value for the effect size was computed by the WWC. This study is characterized as having a statistically significant positive effect because the estimated effect is positive and statistically significant, and no effects are negative and statistically significant, accounting for multiple comparisons. For more information, please refer to the WWC Standards and Procedures Handbook (version 3.0), p. 26.

Appendix D: Supplemental findings for the academic achievement domain

Domain and outcome measure	Study sample	Sample size	Mean (standard deviation)		WWC calculations			p-value
			Intervention group	Comparison group	Mean difference	Effect size	Improvement index	
Academic achievement								
<i>Grade point average</i>	Malleable pen pal intervention vs. pen pal comparison	51 students	3.46 (0.30)	3.19 (0.33)	0.27	0.85	+30	.004
<i>Grade point average</i>	Malleable pen pal intervention vs. no pen pal comparison	56 students	3.46 (0.30)	3.23 (0.33)	0.24	0.74	+27	.008

Table Notes: The supplemental findings presented in this table are additional findings that meet WWC design standards with or without reservations, but that do not factor into the determination of the evidence rating. For mean difference, effect size, and improvement index values reported in the table, a positive number favors the intervention group and a negative number favors the comparison group. The effect size is a standardized measure of the effect of an intervention on individual outcomes, representing the average change expected for all individuals who are given the intervention (measured in standard deviations of the outcome measure). The improvement index is an alternate presentation of the effect size, reflecting the change in an average individual's percentile rank that can be expected if the individual is given the intervention. Some statistics may not sum as expected due to rounding.

Study Notes: The data presented in this table were obtained from the authors' response to a data request from the WWC. The standard deviations for the two comparison groups were not reported separately; the WWC, therefore, used the combined comparison group standard deviation as the standard deviation for each comparison group. The p-values reported in the table were computed by the WWC under the assumption of the independence of the two effect sizes.

Endnotes

¹ 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 review protocol for individual studies in the Postsecondary Education topic area (version 3.1). The WWC rating applies only to the study outcome that was eligible for review under this topic area. The reported analyses in this SSR are only for the eligible outcomes that met WWC group design standards without reservations, and do not necessarily apply to all results presented in the study.

² The two comparison groups employed in this study were combined for this single study review by the WWC. Both comparison groups are eligible for review under the review protocol for individual studies in the Postsecondary Education topic area. Computing effect sizes for the single intervention group in this study versus each of the comparison groups, and then aggregating those effects, results in statistical dependencies that make the statistical significance of the combined effect inaccurate. Readers may refer to Appendix D for findings on the intervention group versus each of the comparison groups.

³ There were five outcomes included in the study that are not described in this WWC report. See the table notes in Appendix B for more information.

Recommended Citation

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2016, January). *Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence*. 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.



Intervention
Report



Practice
Guide



Quick
Review



Single Study
Review

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.

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