

ADULT BASIC EDUCATION READING META-ANALYSIS

Findings from a Synthesis and Meta-Analysis of Adult Basic

Education Reading Skills

Tonya Eberhart, Ph. D.*

The University of Kansas

1122 West Campus Road , J.R.P. Hall

Lawrence, KS 66049

785 550 4241

teberhart@ku.edu

Ling Zhang, Ph. D.

The University of Kansas

1122 West Campus Road , J.R.P. Hall

Lawrence, KS 66049

785 864 4780

elainezhang-86@ku.edu

Michael Hock, Ph. D.

The University of Kansas

1122 West Campus Road , J.R.P. Hall

Lawrence, KS 66049

mhock@ku.edu

785 331 8297

Abstract

This study uniquely combines research synthesis and meta-analytic methodology to better contextualize and inform researchers and practitioners on the impact of interventions for Adult Basic Education (ABE) students with low reading comprehension proficiency. After synthesizing studies on ABE student reading comprehension outcomes, a meta-analysis was conducted to add effect size statistics to the contextual features of each of the studies. Findings from 17 experimental studies with 198 effects found that word level, fluency, vocabulary, and language skill-based treatments positively affected some ABE student reading comprehension outcomes. Scores on standardized measures of reading skills were mixed. While some effects were positive, the effect size for all treatments was small (Hedges $g = .17$) but promising given the history of ABE intervention outcomes.

Findings from a Synthesis and Meta-Analysis of Adult Basic Education Reading Skills

Significant numbers of adults demonstrate low proficiency in reading comprehension (e.g., Mellard, Fall, & Woods, 2010; Tighe & Schatschneider, 2016). The cost of chronic low literacy can significantly impact the quality of life experienced by adults. For example, low literacy is associated with lower income levels which, in part, exacerbates inequality of life opportunities (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993; Kutner, Greenberg, Jin, Boyle, Hsu, & Dunleavy, 2007). In addition, limited skills in reading comprehension can present significant challenges for adults in their career path, health advocacy, economic success, family life, and overall opportunity to lead a successful and rewarding life (Curtis, & Kruidenier, 2005). Thus, providing ABE students with reading instruction that dramatically improves reading outcomes is critically important.

To provide adult basic education (ABE) teachers and researchers with evidence of the effectiveness of reading intervention programs, we undertook the task of conducting a *literature synthesis and meta-analysis* of interventions designed to improve reading comprehension for adults in ABE programs. Our overarching goal was to describe and document the impact that reading interventions had on the reading proficiency of adults and to answer the question of whether intervening with adults with low reading proficiency had a measurable effect on ABE student outcomes. A secondary focus of the meta-analysis was to determine which reading component skills had the most significant impact on reading comprehension outcomes. For example, does vocabulary instruction significantly impact reading comprehension for adults in ABE programs? This literature synthesis and meta-analysis highlights our findings regarding those questions and discusses implications for instruction that may improve adult reading proficiency outcomes.

Why a Literature Synthesis and Meta-Analysis?

Identifying reading programs and interventions that impact adult reader proficiency can positively impact adult lives by removing barriers that limit career opportunities, health access and care, quality of family life, and education and training (e.g., Kruidenier, MacArthur, & Wrigley, 2010). Thus, to improve life opportunities and equality for ABE students, we need to know and understand the critical elements of reading comprehension interventions and the most impactful way to support adults in ABE programs as they strive to experience success in life. To enhance the utility of meta-analytic information, we feel it is essential that educational professionals working in ABE settings have a descriptive sense of each of the interventions included in the meta-analysis. Information that more deeply describes the interventions analyzed in the meta-analysis places each of the studies in the context of the instructional environment, professional educators, and students in ABE programs. This contextual information can add depth of understanding about the intervention and may support narrowing the research-to-practice gap. Thus, the current analysis includes a literature synthesis and a meta-analysis that identifies reading interventions that may significantly impact ABE student outcomes and places those interventions in real-world contexts.

What is a Literature Synthesis?

Literature synthesis has been a research tool since the 1990s (Therrien, Cook, B., & Cook, L., 2020). Usually, a researcher reads collected studies on a related topic, creates a summary of each of the studies, and then discusses the implications or effectiveness of the findings (Borenstein, Hedges, Higgins, & Rothstein, 2021). A strength of this approach is that practitioners have access to descriptive information beyond the minimal demographic descriptions provided in most meta-analysis tables. While effect size statistics are critical for

determining intervention effectiveness and impact, having a richer understanding of whether the intervention is a potential fit for a specific program, student, and teacher context can be helpful. However, literature synthesis can provide limited *objective* data on intervention effectiveness based on the researcher's subjective analysis.

What is a Meta-Analysis?

Meta-Analysis uses statistical methods to combine the results of different studies on the same topic. A meta-analysis can answer questions about the overall impact of similar interventions on student outcomes (Borenstein, Hedges, Higgins, & Rothstein, 2010; Therrien, Cook, & Cook, L., 2020). A reading comprehension meta-analysis can help identify which programs help improve reading proficiency and which programs have the most significant impact or effect on student outcomes. In addition, a meta-analysis can answer the question about which component reading skills have the most impact or effect on student reading comprehension outcomes.

This article combines literature synthesis with a meta-analysis of the same data set. This somewhat innovative approach to understanding contextual factors and effect size impact on student outcomes may better inform researchers and instructional professionals about what works best with whom and in what contexts. Combining literature synthesis with meta-analysis is a practice found in other fields like medicine (e.g., Hong, [Choi](#), Hong, Kim, & Lee, 2022). Still, it is rare in educational studies of students in ABE reading studies.

How Did We Conduct the Synthesis and Meta-Analysis?

We followed a standard meta-analytic process documented below (see Therrien, Cook, B., & Cook, L., 2020). Our goal was to conduct a rigorous analysis of the data contained in the literature synthesis and provide practitioners with contextual information on each of the studies

included in the meta-analysis. The literature synthesis followed the process described by Therrien et al. (2020).

Determine Research Questions. A meta-analysis begins with research questions driven by reading theory. An analysis of the 17 studies in this meta-analysis found heterogeneity in reading theory. For example, cognitive and meta-cognitive strategy theory was foundational to seven studies (Brown, 1980). Four studies aligned with the Simple View of Reading (Hoover & Gough, 1990). Language and life experiences theory drove another study (e.g., Ebert, 2019). The remaining articles listed Computer-Assisted Instruction and Community Building as Theory or did not describe reading theory related to the study. However, the remaining studies aligned with theory related to a reading skill component approach to instruction.

Meta-analysis can be used in any situation where the goal is to summarize quantitative findings from multiple empirical studies that examine a common construct and address common research questions. We wanted to explore the extant rigorous research on reading comprehension outcomes for adults in ABE classes for this meta-analysis. The overarching research question for the study was: *What reading interventions or programs have a significant impact on adult basic education reading comprehension outcomes?* Since several of the studies took place with incarcerated youth or adults, we wanted to explore a secondary research question to determine if there is a significant difference between incarcerated student reading comprehension outcomes and those in traditional ABE settings. We identified two hypotheses to cast our initial projections of findings.

Hypothesis #1: The overall impact (effect size) of reading interventions for students in ABE programs will be small ($ES = <.20$) as measured by standardized reading comprehension tests. This hypothesis was based on previous research in which the effect size of numerous studies was

found to be small ($ES = <.20$) (e.g., Greenberg, Wise, Morris, Fredrick, Nanda, & Pae, 2011; Kruidenier, MacArthur, & Wrigley, 2010).

Hypothesis #2: The reading component skills with the most significant impact (effect size) on ABE reading comprehension scores will include word-level and linguistic skills, supporting the Simple View of Reading (Hoover & Gough, 1990). Numerous studies have supported the Simple View of Reading theory with adult learners, with researchers reporting multiple word level and linguistic skills accounting for reading comprehension variance for ABE students (Braze, Tabor, Shankweiler & Menel, 2007; MacArthur et al., 2010; Mellard & Fall, 2012; Nanda et al., 2010; Sabitini et al., 2010; Tighe & Schatschneider, 2016).

Synthesis of Adult Reading Comprehension Interventions

The information presented in the literature synthesis is organized by topics related to reading proficiency component skills. Specifically, the reviews are grouped under word-level programs and interventions, fluency, vocabulary, technology-supported programs, comprehensive reading comprehension, and reading strategy instruction. We conducted a systematic search for experimental and quasi-experimental studies examining the effects of adult literacy programs on reading comprehension outcomes. The search procedure is described in detail in the Methods section.

Word Level Skills

Alamprese, J. A., MacArthur, C. A., Price, C., & Knight, D. (2011). Effects of a structured decoding curriculum on adult literacy learners' reading development. *Journal of Research on Educational Effectiveness*, 4(2), 154-172. doi:10.1080/19345747.2011.555294

This study aimed to develop and test the impact of a decoding curriculum, Making Sense of Decoding and Spelling (MSDS), on the reading skills of adult literacy learners. A developed

curriculum (MSDS) was used to teach (1) decoding, (2) spelling, and basic alphabetic decoding skills. A randomized control field trial (RCT) with the random assignment at the program level to treatment and control groups was used to evaluate the program. Sixteen ABE programs that offered class-based reading instruction to adult learners at the Low-Intermediate level were recruited for the study. The results of this study were mixed. The MSDS program had significant and positive effects on students' scores for decoding and spelling. The results for word recognition were mixed, Fluency scores were not significant, and the results for reading comprehension were negative. The MSDS seems somewhat effective when teaching decoding and spelling to adults in intermediate ABE programs but not significantly impactful when teaching word recognition, fluency, and reading comprehension. The extent of any change was small. The MSDS curriculum is specifically designed to be part of a three-part curriculum that includes a) decoding and spelling, b) vocabulary, and c) comprehension. A key finding in this study supports the notion that students in intermediate ABE classes will need explicit instruction in all reading skill components. Instruction in decoding and spelling alone may be insufficient to impact reading comprehension proficiency.

Robinson, S. A. (2018). A study designed to increase the literacy skills of incarcerated adults. *The Journal of Correctional Education, 69(1), 60-72.*

The stated purpose of this study was to determine if adults in treatment groups across five midwestern correctional institutions who received an adaptation of Orton-Gillingham (i.e., Pure and Complete Phonics, Nash, 2013) would outperform control groups who received the institution's standard reading program. The adaptation was to include group-based instruction practices. Pure and Complete Phonics (PCP) was the instructional technique used to correct the language deficits of students with learning disabilities. Instruction includes direct, explicit, and

multi-sensory instruction. The study took place across five adult institutions in a Midwest state, which consisted of two women's and three men's medium-security facilities. Instruction was implemented for 15 weeks, five days a week for one hour a day, by certified teachers. All participants had fifth grade or lower scores on the Test of Adult Basic Education. The study included 41 male and female students.

The pre-and post-test scores between the treatment and control groups showed a positive effect for the treatment group on three of four measures. Any specific word recognition and reading fluency scores showed a medium effect size gain.

Essential for teachers was the finding that the control group made little or no gains after 15 weeks of instruction, as found in other studies. The researchers in the current study found that moderate effects could be attained by using the PCP curriculum.

Scarborough, H. S., Sabatini, J. P., Shore, J., Cutting, L. E., Pugh, K., & Katz, L. (2012).

Meaningful reading gains by adult literacy learners. *Reading and Writing, 26(4), 593-613.*

doi:10.1007/s11145-012-9385-4

This study aimed to examine individual gains by adult learners in response to three kinds of reading instruction. A three-group random assignment experiment was conducted to help determine the effectiveness of reading curricula for individual students. The reading programs were: Corrective Reading, a direct instruction phonics program with the primary aim of strengthening decoding and identifying printed words. The RAVE-O program focused on retrieval, automaticity, vocabulary, engagement, and orthography. The third program, Guided Repeated Reading, is widely used with younger students to strengthen fluency. The analysis approach used examined within-individual gains replicated over tests. Performance was higher on the posttest than on the pretest, and all three instructional methods were equally effective in

improving reading skills. The most significant average increase was seen for Word Attack skills. The three programs evaluated in this study showed promise for increasing student word attack, decoding, and word recognition skills for ABE students with very low word-level skills. The article has a detailed description of the reading programs, the students who participated in the study, and the analysis and findings of the study.

Shippen, M. E. (2008). A pilot study of the efficacy of two adult basic literacy programs for incarcerated males. *Journal of Correctional Education, 59(4), 339-347*. Retrieved from <http://www.jstor.org/stable/23282599>

This study aimed to compare the effects of two adult basic reading programs, Direct Instruction Corrective Reading Decoding and Laubach Literacy, on the reading achievement of incarcerated male adults. The adult participants were reading below the 5th-grade level. Instruction by the tutors was implemented over six months. Data for basic literacy (e.g., word identification, word attack, and reading comprehension) were collected. The DI model emphasizes fast-paced, scripted, well-sequenced, rule-based, and highly focused lessons. The Laubach Literacy method of teaching reading also uses a scripted and explicit approach but initially uses illustrations that are faded over time. Results indicated that neither program was superior to the other. However, all students significantly improved in one or more areas of basic literacy. Adult educators have implemented the Corrective Reading Decoding and the Laubach Literacy programs for quite some time. Both programs are equally effective in improving student word-level skills. However, their impact on improving comprehension is mixed.

Vocabulary

Gray, S. H., Ehri, L. C., & Locke, J. L. (2018). Morpho-phonemic analysis

boosts word reading for adult struggling readers. *Read Write*, 31(1), 75-98.

doi:10.1007/s11145017-9774-9.

The purpose of the study was to compare the effects of two kinds of vocabulary instruction on the component reading skills of adult struggling readers. Participants received tutoring to learn forty academic vocabulary words embedded within a civics curriculum. A randomized control trial study was used to assess effectiveness. Students were assigned to morpho-phonemic analysis or traditional whole-word study. Participants were 34 GED students who were minority language learners aged 19-31. Both groups made comparable gains in learning the target words. Still, the morpho-phonemic group showed greater gains in reading unfamiliar words on standardized word reading tests, including word attack and word recognition. However, vocabulary and reading comprehension scores showed a small or negative impact on some measures. The generalization of learned skills is a challenge. The finding that the morpho-phonemic intervention supported generalization is promising. The limited impact on comprehension may be a factor of limited intervention duration.

Vocabulary Technology-Assisted Instruction

Dilenschneider, R. F. (2018). Examining the conditions of using an online dictionary to learn words and comprehend texts. *ReCALL*, 30(1), 4-23 *doi:10.1017/S0958344017000234*

The primary purpose of this study was to compare the effectiveness of learning vocabulary and understanding passage content using online dictionaries across a non-traditional ABE population. While the Japanese medical students were highly literate, how they best learned second language vocabulary might have implications for more traditional ABE populations. The recall and recognition of word forms and word meanings and passage comprehension data were analyzed using the Rasch model. Probabilities of $p < .05$ were considered measurably different,

and probabilities of $p < .003$ were considered statistically significant and generalizable to a larger population. The students were 84 Japanese medical students. According to the analysis of score data, results varied across conditions. Support for the use of online dictionaries found the spelling condition most effective. However, control students outperformed treatment students on a measure of reading comprehension. The results of this study are mixed with spelling and some word-level skills improvement. The lack of improvement in reading comprehension is a concern.

Comprehension Instruction

Spires, H. A., & Schmelzer, R. M. (1990). Effects of interspersed adjunct questions on comprehension monitoring: implications for postsecondary reading instruction. *Research and Teaching in Developmental Education, 7(1)*, 19-24. Retrieved from <https://www.jstor.org/stable/42801788>

This study aimed to investigate the effects of interspersed-adjunct summary questions on comprehension and comprehension monitoring of developmental class community college students. Participants were randomly assigned to an experimental or control group. Experimental groups received reading instruction using the reading course delivered on CD ROM over 11 weeks of instructional time. The treatment group read a passage and were stopped at time points and asked to summarize "chunks" of text. The control group read the passage without pausing. Pre and post-test data were analyzed using two 2 X 2 (treatment and ability) analyses of variance (ANOVA). There were no significant differences between the treatment and control groups. However, students who scored lower on pre-tests did show significant gains on a non-standardized comprehension posttest. Overall, the finding that there were no between-group differences (as found in other studies using the same process) suggests that the process may not be effective for all but the lowest-level readers. The finding that less-skilled college readers were

found to benefit from the reading approach seems to support focusing the instructional strategy on students lacking comprehension skills.

Comprehension- Strategy Instruction

Hock, M. F., & Mellard, D. F. (2011). Efficacy of learning strategies instruction in adult basic education. *Journal of Research on Educational Effectiveness*, 4(2), 134-153.

doi:10.1080/19345747.2011.555291

This study aimed to evaluate the effects of cognitive reading strategies on the reading comprehension proficiency of ABE adults. Results from randomized controlled trials of learning strategies instruction with 375 ABE participants are reported. Participants ranged in age from 16 to 74 years, with an average age of 27.7. Fidelity of implementation checks confirmed low fidelity to the intervention in experimental classes and no apparent learning strategy instruction in the control classes. Fidelity issues were related to curricular coverage and students' dosage. Adherence to program implementation was adequate. Four reading strategies were taught: The Bridging Strategy (multiple word-level skills), The Building Fluency Strategy, The Prediction Strategy, and The Summarization Strategy. Both experimental and control conditions experienced high attrition and low attendance, thus limiting results. Instruction dosage did not approach the required levels for any of the strategies. Data analysis showed no significant differences between experimental and control classes for reading comprehension assessments. While there exists a robust database on the effectiveness of reading strategy instruction for adolescents, limitations of coverage and dosage for ABE students in this study suggest that strategy instruction for students with limited exposure to intervention may not be effective.

Huang, J., & Newbern, C. (2012). The effects of metacognitive reading strategy instruction on reading performance of adult ESL learners with limited English and

literacy skills. *Secondary and Basic Education*, 1(2), 66-77.

This study describes an evaluation that examines the effects of metacognitive reading strategy instruction on the reading performance of adult ESL learners with limited English and literacy skills. A quasi-experimental design was used to compare the results of strategy instruction between a treatment group and a comparison group. Strategy instruction was implemented over four months with 18 learners enrolled in a beginning ABE literacy program. Participants included 23 male and 13 female ESL students. Analysis of reading comprehension scores showed that metacognitive reading strategy instruction could be effective for adult ESL learners with limited English skills. Researchers compared reading gains among various initial reading levels. They found metacognitive strategy instruction to be most effective with readers who scored higher on pre-tests. Thus, a lack of word-level skills may hamper metacognitive reading strategy instruction.

Kavani, R., & Amjadiparvar, A. (2018). The effect of strategy-based instruction on motivation, self-regulated learning, and reading comprehension ability of Iranian EFL learning. *Cogent Education*, 5(1), 1556196. doi:10.1080/2331186X.2018.1556196.

The purpose of this study was to investigate the effect of strategy-based instruction (SBI) on motivation, self-regulated learning, and the reading comprehension ability of Iranian English as a Foreign Language (EFL) learners. Again, while this adult sample is a nontraditional United States ABE group, strategy-based instruction effects may inform the acquisition of reading-related skills. Fifty-five intermediate EFL learners (female) were selected and randomly assigned to two groups - a control group and an experimental group. Motivation and self-regulated learning questionnaires and a reading comprehension test was administered as pre-and post-tests. The curriculum implemented was the *Developing Skills* coursebook and six additional reading

strategies. A MANCOVA analysis of the data revealed that the intervention significantly affected foreign language learners' reading comprehension, motivation, and self-regulation (SR). The authors conclude that additional studies are needed to examine the impact of the curriculum on other populations in other countries. Additionally, the course book, *Developing Skills* (by L. G. Alexander) was used. The sample in this study was Iranian English Language Learners. The impact of the intervention on English-speaking students in ABE programs in the United States is unknown. However, the effectiveness of reading strategy instruction is supported by this specific population.

Meyer, B. J. F., & Poon, L. W. (2001). Effects of structure strategy training and signaling on recall of text. *Journal of Educational Psychology, 93*(1), 141-159.

doi:10.1037//0022-0663.93.1.141

This study aimed to evaluate the effectiveness of structure strategy training on total recall from texts and informative videos. The structure strategy was used to teach learners to identify and use signaling in the text to aid their encoding and organize their recall. The training involved direct instruction, modeling, and practice, individually and with a partner, to teach effective use of text structure for encoding and retrieval with a wide variety of texts. Participants were assigned to the training conditions through a stratified random assignment procedure. The total number of participants was 121, split into 56 young adults and 65 older adults. Participants' age range was approximately 20 to 71 years. A MANOVA examining age group, training condition, and signaling was conducted for age, education, vocabulary, reading comprehension, working memory reaction time, and cognitive functioning. Structure strategy training increased the amount of information remembered and recalled the essential information. The findings of this study are significant because they show that readers can be taught with a structure strategy and

can use it effectively to increase total recall, regardless of whether or not text structures are provided.

Comprehensive Reading Programs (Includes Word Level and Comprehension)

Greenberg, D., Wise, J., Morris, R., Fredrick, L., Nanda, A. O., & Pae, H. K. (2011). A randomized control study of instructional approaches for struggling adult readers.

Journal of Research Education Effectiveness, 4(2). doi:10.1080/19345747.2011.55528

The primary aim of this study was to investigate which intervention or combination of interventions is the most effective in increasing the reading and reading-related skills of adults who read between the 3.0 and 5.9 single-word grade equivalencies. The interventions focused on remediating decoding, fluency, and reading comprehension deficits and varied from very explicit and scripted instruction to more implicit and learner-centered instruction. Students were randomly assigned to one of the following approaches: Decoding and Fluency, Decoding, Comprehension; Fluency Extensive Reading; Decoding, Comprehension, Extensive Reading, and Fluency, and a generic Control/Comparison approach. Participants were from 23 adult literacy programs. Results indicated continued weaknesses in all reading component skills with small effects or impact scores. Overall growth in reading component skills seems limited in this study. Comprehensive reading programs may not always generalize results to adult populations.

Technology-Assisted Reading Instruction

Batchelder, J., & Rachal, J. (2000). Effects of a computer-assisted-instruction program in a prison setting: An experimental study. *Journal of Correctional Education*, 51(4), 324-332.

Retrieved from <http://www.jstor.org/stable/41971952>

The overall purpose of this study was to discover whether or not there were statistically significant differences in CASAS math and reading achievement scores between inmates who

were treated with a computer-assisted plus traditional instruction combination and inmates who were treated with conventional instruction alone. Study participants were aged 19 to 53 years old. None of the students had completed high school. The study included 71 male inmates placed in a GED program (reading at the 8th-grade level or above) or an ABE program if reading below the 8th-grade level based on the Test of Adult Basic Education (TABE) results. Students were placed in the ABE or GED treatment groups and compared to students who received BAU instruction without CAI. Results of math and reading improvements were measured pre and post using the Comprehensive Adult Student Assessment System (CASAS) scores. Results showed no significant differences between either treatment and the comparison group. Thus, using CAI, math and reading instruction did not significantly differ from the BAU group. The Researchers suggested that several factors accounted for the lack of gains. For example, the participants' attitude deteriorated as the study progressed, resulting in minimal effort at post-test. Students' overall motivation to participate in education was very low. The teachers were somewhat detached from the CAI instructional component of instruction. This study extends the research on CAI with a unique adult population highlighting challenges with CAI instruction in prison. Gretes, J. A., & Green, M. (1994). The effect of interactive cd rom/digitized audio courseware on reading among low-literate adults. *Computers in the Schools, 11(2), 27-43*.

doi:10.1300/J025v11n02_04

Researchers conducted two studies related to the effectiveness of interactive CD ROM digitized audio courseware on the reading skills of low-literate adults. Researchers developed the READY Course, which contained multimedia units on practical life skill topics such as eating right, buying a car, or saving money. Students read passages on the topics using a multimedia tool during the reading process to learn vocabulary. The text could also be listened to as the

reader progressed through the lessons. Two studies were conducted. In Study 1, a single-group design was used. Seventy-nine male and female students in an ABE program were taught reading using the READY Program. Posttest results showed a GE reading gain of 1.33 years on the TABE. In Study 2, 488 ABE students pursuing GED certification participated in the study and were taught the READY program. Students were randomly placed into an experimental or a matched BAU control group. The CBT McGraw-Hill Tests of Adult Basic Education (TABE) were used for initial placement. Statistically, significant differences favoring the experimental group were found. The interactive multi-media course was more effective than BAU in this study.

Houchins, D. E., Gagnon, J. C., Lane, H. B., Lambert, R. G., & McCray, E. D. (2018). The efficacy of a literacy intervention for incarcerated adolescents. *Residential Treatment for Children & Youth, 35(1)*, 60-91. doi:10.1080/0886571X.2018.1448739

This randomized trial investigated the efficacy of a literacy intervention for low-performing readers in juvenile corrections settings over 31 months. The term juvenile in this study includes individuals aged 12 to 18 who were no longer served in traditional schools. The study used curriculum-based comprehension measures, oral reading fluency, and spelling and standardized diagnostic reading and language assessments to examine treatment effects. The reading program evaluated was Read 180®, a blended literacy intervention program (Houghton Mifflin Harcourt, 2017). Students received 110-min of daily literacy instruction.

The average total amount of instruction across both groups was 137 hours. This study was conducted over 31 months in one rural private medium security, long-term residential facility. Forty-three percent of the participants had an IEP. Caucasian students made up 41.0% of the sample. African American students made up about 48% of the sample. About 12% of the

sample were Hispanic. Significant differences in measures of reading comprehension were found between the treatment group and the control group in favor of the treatment group. However, the results were mixed. Both treatment and control groups made significant growth on the following measures: brief reading, broad reading, letter word dedication, oral comprehension, passage comprehension, and reading fluency. Effective results were found for reading comprehension and language, favoring the treatment group. The authors concluded that Read 180 has the potential to improve the reading proficiency of incarcerated adolescents and young adults.

McKane, P. F., & Greene, B. A. (1996). The use of theory-based computer-assisted instruction in correctional centers to enhance the reading skills of reading disadvantaged adults. *Journal of Educational Computing Research*, 15(4), 331-344. doi:10.2190/G806PQTL-LRQE KXXQ.

This study aimed to examine the effectiveness of theory-based CAI for reading with incarcerated adults reading below the ninth-grade level. Five of Oklahoma's Correctional Centers participated in the study. All 150 volunteers were randomly assigned to either the CAI or non-CAI group. Three were minimum security centers for males; two were female correctional centers. The software package used to train the students in this study was AUTOSKIL. Results showed a significant reading achievement gain for computer-assisted reading instruction compared to traditional instruction for entry levels of 0-3.0 Grade Equivalency Level (GEL). There were no significant gains for the two other reading groups. This study found statistically significant gains for the 0-3.0 level group and about one-grade level growth above the control students. However, there were no statistically significant differences for students reading at higher levels (i.e., 3.1 to 6.0 and 6.1 to 9.0)

Community Building and Reading

Roberts, R. E., DDS, MSW, Ph.D., Cheek, E. H. Ph.D., & Mumm, R. S. MS

(1994). Group intervention and reading performance in a medium-security prison facility.

Journal of Offender Rehabilitation, 20(3-4), 97-116. doi:10.1300/J076v20n03_06

This project aimed to test the effects of an innovative group process and community building intervention technique on reading performance among incarcerated adult males. The Community-Building Group-Process (CBGP) intervention and the SRA reading program were implemented with incarcerated adults. The program was based on a model of cooperative learning developed at John Hopkins University. The SRA reading program cycle of activities was adapted to include Teacher Instruction, Team Practice, Individual Assessment, and Recognition. The study was held at Dixon Correctional Institute, a medium-security prison in Louisiana, for seven weeks. Approximately 50 incarcerated males aged 19-49 were included in the study. 83% of the group were black, and 17% were white. Much of the study is related to social-emotional learning characteristics and change. The impact on reading growth was also assessed. Analysis of variance (ANOVA) showed that Gates-MacGinitie reading gain scores were significantly greater for the Experimental Group than for the two control groups. Instructors and teachers interested in building student communities of practice may find this model of community building helpful. Analysis of the data supports the effectiveness of the community-building model in producing significantly significant reading gains when paired with SRA Reading.

The Supplemental Material file provides a detailed analysis of each reviewed study. It gives the reader effect size data on each intervention included in all 17 articles. For example, the information will be helpful to readers interested in examining the effects of decoding interventions on ABE reading outcomes across each study.

Methods

Database and Search Procedure

We conducted a systematic search for experimental and quasi-experimental studies examining the effects of adult literacy programs. Four databases, including Education Resources Information Center (ERIC), Academic Search Complete (ASC), PsycInfo, and Web of Science, were utilized to search relevant studies. We followed an adapted version of *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (PRISMA; Liberati et al., 2020) to search for and screen articles (see Figure 1). We applied a Boolean search that combines three parts of the search string: 1) keywords regarding reading or literacy instruction, 2) keywords regarding adult learners, and 3) keywords regarding experimental research design (see Supplementary Table for precise search terms). The keywords in each set were first connected by a Boolean OR operator within the respective settings for the search. A Boolean AND operator was subsequently used to combine keywords across the three sets to achieve the maximum number of combinations. After entering the search terms, we set two search parameters, which included 1) the studies written in English and 2) the studies published in peer-reviewed journals. This initial search yielded 311 articles. We conducted an additional investigation whereby the reference lists of previous meta-analyses of adult literacy (e.g., Tighe & Schatschneider, 2016; Swanson & Hsieh, 2009) were reviewed and identified 72 relevant articles that were added to the pool of studies for screening. In total, 373 articles were retrieved for abstract screening after removing ten duplicates.

Inclusion and Exclusion Criteria

We screened the title and abstract of 373 articles to determine eligibility for inclusion and determined that 331 articles remained to be assessed for eligibility and quality. We examined

each study by applying the following inclusion and exclusion criteria: 1) Young adults in the study were at least 16 years old and not enrolled in high school classes; 2) The study included young adults with low literacy skills who are enrolled in literacy or vocational programs that included an explicit reading component; 3) Studies included at least one outcome measure assessing reading performance that evaluated the effects of the intervention; 4) Studies employed a randomized controlled trial (RCT) or a quasi-experimental design (QE) and compared students in comparison treatment groups taught using a specific reading intervention with those in control groups; 5) The intervention was delivered in English. However, the students did not need to have English as a first language classification. Thus, non-English native speakers were included in the study; 6) Interventions focused on word study (alphabetic, decoding, word identification, or word recognition), fluency, vocabulary, reading comprehension strategies, or multiple components of reading instruction; and 7) Studies needed to include ES data or data that could be used to calculate an effect size. We excluded studies that employed a single group pre-and post-test design or targeted a population with a reading level below the 5th percentile. The screening and eligibility review process included 19 experimental or quasi-experimental studies, including two single-case design studies. We excluded the single case design studies from the analysis since data to calculate an effect size was not included in the studies, and the studies did not meet What Works Clearinghouse (WWC) criteria for rigor. The search process is described in Figure 1.

Coding Scheme

Included articles were coded based on participant characteristics, literacy program characteristics, and study characteristics from which data were collected for calculating effect sizes. Codes designed to collect participant characteristics include the number of participants,

age range, ethnicity, gender, and reading skill level. Literacy program descriptions were compiled and coded to identify the specific reading component(s). For example, Shippen (2008) reported Direct Instruction Corrective Reading Decoding and Laubach Literacy as two treatments for adolescents and adults who had difficulty in basic reading coding and comprehension skills. Codes for study characteristics also captured the research setting, type of research design (i.e., two-group pretest-posttest design), duration of the intervention, and outcome measures.

A large variation was found in outcome measures used in included articles; thus, we categorized the type of measures into four groups that focused on examining participants': 1) *Word-Level skills* such as decoding, spelling, and word recognition; 2) *Vocabulary skills*; 3) *Fluency skills* such as reading fluency and correct words per minute; and 4) *Comprehension skills* such as passage comprehension, reading scores, summary quality, and recalling main ideas. We coded the sample sizes, means, and standard deviations of both control and treatment groups for experimental or quasi-experimental studies to extract data for computing effect sizes.

Interrater reliability of data extraction

Two steps were applied to establish interrater reliability (IRR). Two authors independently coded 10% of the included articles for study characteristics and outcome measures. After independent coding, all authors convened to review discrepancies in coding. Disagreements were discussed until a consensus was achieved. After achieving the agreement, the first author coded all the remaining articles, and another author coded 20% of the remaining articles ($n = 15$). We calculated IRR by dividing the number of disagreements by the total number of agreements and disagreements multiplied by 100. Overall, IRR was 95%. Disagreements were resolved by discussion to consensus among all authors.

Effect-Size Calculation and Data Analysis

Effect size is a numeric index that measures the magnitude of the relationship between the independent and dependent variables or the difference between two groups (Borenstein et al., 2009). The present study aimed to measure the magnitude of impacts of reading interventions on adult basic education reader comprehension outcomes. We used Hedges' g to measure the effect sizes of each study, given that the samples in included studies were relatively small, and Hedges' g correction was used to reduce the small sample size bias (Borenstein et al., 2009).

We first computed the standardized mean differences of the post-test scores for each outcome measure between the control and treatment groups. The effect size was calculated for each outcome measure by dividing the mean difference by the standard deviation. If means, standard deviations, or other raw data were not available, existing effect sizes reported in the original articles were used to compute the pooled effect sizes. We extracted effect sizes for each outcome and calculated separate effect sizes when different measures in an intervention assessed multiple reading outcomes. For example, we removed 24 effect sizes from Gray et al. (2018), where researchers investigated two literacy interventions and measured 12 reading-related outcomes for each intervention. The average effect size was calculated for each group of studies based on reading outcome measures (i.e., word-level, vocabulary, fluency, comprehension). Moreover, the overall effect size of adult literacy interventions was estimated by averaging effect sizes from all measures.

We applied a random-effects model to analyze the effect sizes. We hypothesized that the effect size varied across studies due to variations in such factors as different literacy interventions, contextual implementation, and reading-related outcome measures (Borenstein et al., 2010). We also used the model to estimate the average effect size for the four identified

groups of studies and the overall effect size for all studies. To answer the second research question related to differences in reading comprehension outcomes for incarcerated students and those in traditional ABE settings, we conducted a subgroup analysis to compare the effect sizes of reading interventions for these two groups. All analyses were performed using R's "metaphor" package (R Core Team, 2021).

Results

A total of 17 experimental and quasi-experimental studies provided 198 effect sizes. These studies spanned from 1994 to 2018. A total sample size of 2,340 ABE students was reported in the included studies, ranging from 14 to 488 students across the studies.

Overall Effect Sizes

The 17 experimental and quasi-experimental studies included in the meta-analysis yielded 198 effect sizes for measures based on four categories of reading-related outcomes (see Table 1). The overall effect size, $g = 0.168$, was statistically significant ($p < 0.001$, 95% CI [0.113, 0.222]). The Q-statistic for the test of heterogeneity was statistically significant ($Q = 502.82$, $df = 197$, $p < 0.001$). Additionally, I^2 indicated that 60.8% of the observed variance between ESs was accounted for by true variance between studies on adult literacy interventions. Thus, we conducted further analyses to explore ESs of different intervention types.

Ninety-one effect sizes fell under the topic of word-level interventions investigated in nine studies. The overall effect size for this group, $g = 0.154$, was statistically significant ($p < 0.001$, 95% CI [0.0872, 0.2214]). The Q-statistic for the heterogeneity test was statistically significant ($Q = 163.09$, $df = 90$, $p < 0.001$), and I^2 indicated that 44.8% of the observed variance in ESs was due to variance across this category of studies.

There were 52 effect sizes reflective of reading comprehension interventions reported in 13 studies, which resulted in an overall effect size, $g = 0.210$, which was statistically significant ($p < 0.001$, 95% CI [0.0657, 0.3551]). A statistically significant amount of heterogeneity was detected ($Q = 184.91$, $df = 51$, $p < 0.001$), and 72.4% (indicated by I^2) of the observed variation in ESs was accounted for by sampling error among this category of studies.

There were 23 effect sizes for four vocabulary studies, the overall effect size of which was not statistically significant ($g = 0.059$, $p = 0.436$, 95% CI [-0.0955, 0.2139]). The variability between studies in this category was not statistically significant ($Q = 39.12$, $df = 22$, $p = 0.014$), but I^2 indicated that 43.8% of the observed variance in ESs was due to differences across studies. Finally, there were 14 effect sizes that focused on fluency interventions from four studies, resulting in a statistically significant overall effect size ($g = 0.200$, $p < 0.001$, 95% CI [0.1109, 0.2893]). The variability between studies in this category was not statistically significant ($Q = 7.20$, $df = 13$, $p = 0.892$). Additionally, there was no variation in ESs ($I^2 = 0\%$) attributed to true study differences.

Incarcerated Versus Non-Incarcerated Students

Table 2 shows the results of the subgroup analysis on effect sizes of reading intervention outcomes for students in incarcerated and non-incarcerated settings. Of the 17 studies, six included incarcerated students as participants, yielding 27 effect sizes across all reading interventions. The overall effect size for this group was small, but statistically significant ($g = 0.099$, $p < 0.001$, 95% CI [0.057, 0.141]). There were 171 effect sizes for students in traditional ABE settings, the overall effect size of which was statistically significant ($g = 0.174$, $p < 0.001$, 95% CI [0.110, 0.237]). However, the difference in effect size for the two groups was statistically insignificant ($p = 0.052$).

Discussion

Our search resulted in a limited number of experimental and quasi-experimental studies supporting the findings of other researchers that rigorous studies of ABE reading outcomes are limited. This makes it difficult to conclude the effects of ABE interventions on reading comprehension. In addition, the vast majority of studies we reviewed were underpowered RCT or quasi-experimental designs. However, given the limited rigorous studies focused on ABE students and reading comprehension outcomes, our findings mainly support previous findings that ABE students can improve reading component skills and reading comprehension proficiency when specific interventions are taught under certain contextual conditions.

Reading component skills effects

Studies focused on Word level Skills had an effect size of $d = 0.22$. This could be considered a small effect, but an important finding as growth is documented and at the higher end of the small effect range might be regarded as the upper end. Similarly, interventions focused on reading comprehension had an effect size of $d = 0.21$, also a promising finding. Fluency interventions resulted in an effect size of $d = 0.22$. Finally, vocabulary interventions had an effect size of $d = 0.10$, which was the smallest effect of all reading skill components measured. However, the findings related to our small sample of vocabulary studies contrast with other studies that found much stronger outcomes for vocabulary-based interventions and programs (e.g., Talwar, Tighe, & Greenberg, 2018). When we explored this finding further, we found that one study had a very large *negative* effect on expressive vocabulary, not found in the other studies that focused on vocabulary instruction (see Supplemental Material file). The finding from this one study may have skewed the results of the vocabulary effects.

Overall, we found support for hypothesis #2 that findings would align with the Simple View of Reading. That is, word level and linguistic reading skills had a measurable impact on reading comprehension outcomes. Our meta-analysis and literature synthesis found small to low medium effects on word level, fluency, vocabulary, and linguistic skills.

The current meta-analysis confirmed several findings from previous studies and meta-analyses of what works for adults in ABE programs and with low reading achievement. While we found that some researchers identified four major reading component skill areas, other researchers identified 10 reading component skills that had a moderate to large impact on the reading achievement of adults (e.g., Tighe & Schatschneider, 2014). Still, other researchers have identified multiple reading component skills that impact the reading achievement of adults (e.g., Kruidenier, MacArthur, & Wrigley, 2010). Thus, our meta-analysis confirms previous findings that support the notion that adults in ABE programs can benefit from reading instruction and that instruction in reading component skills, based on individual needs, can improve reading proficiency. In addition, we found that reading interventions for ABE students served in detention or prisons can benefit reading instruction mainly when personal and structural barriers are addressed. However, results are less impactful than with students in traditional ABE programs.

This meta-analysis and literature synthesis showed that adults in ABE programs could benefit from targeted instruction in reading skills. While the effect sizes could be considered small, the fact is that across all studies included in this meta-analysis, we found that not only were differences in student reading outcomes statistically significant, but the effect sizes were positive and strong enough to indicate that instruction is beneficial for adults with lower reading achievement. In addition to the results that found an overall small effect for reading instruction

with ABE students, an analysis of reading component skills found that all reading component skills had positive if somewhat limited effects on reading comprehension. Word-level instruction, fluency instruction, and comprehension all had similar effect sizes and were at the top of what is often considered a small effect range. Vocabulary was an exception, with a smaller effect size than the other component skills analyzed. We are encouraged that this meta-analysis confirmed findings from other studies that find ABE students can benefit from reading instruction. The impact of that instruction may be lower than what is desired, but it still shows that reading instructions for adults can be a worthwhile effort.

Implications for Practitioners and Researchers

Instructors in ABE programs should find encouragement in the findings from this literature synthesis and meta-analysis. The analysis supports the notion that reading instruction can have statistically significant effects on adults and that the impact of that instruction is worthwhile. In short, students in ABE programs can become more proficient readers with the proper instruction.

Instructors in ABE programs should feel confident that instruction in reading component skills is a worthwhile endeavor and can have significant and positive effects on overall ABE student reading achievement. All of the component skills analyzed in this study had effects ranging from .10 to .22, signaling that word-level skills, fluency, comprehension, and vocabulary are reading component skills that positively impact reading comprehension. Instructors should know that ABE students will have various reading component skill profiles. Instructors need to be able to assess student reading needs and develop intervention plans designed to address both strengths and improve skills that are not strong. Programming that attempts to teach all reading component skills to all students in the same fashion may be counterproductive. Progress

monitoring and formative assessment can be critical aspects of effective reading programs for ABE students.

While this meta-analysis found lower effects for vocabulary instruction, this finding should be approached with caution. Other studies have found vocabulary to have a positive and medium impact. Instructors might want to pay particular attention to expressive vocabulary instruction as this area was challenging for some ABE students. Expressive vocabulary instruction, in one instance, did show significant adverse effects. In addition, the literature synthesis provided information on under what program, teacher, and student contexts each of the studies was conducted providing practitioners and researchers with information that might support successful implementation in similar contexts.

Standard adult literacy achievement measures like the TABE and the CASAS do not report component reading skill levels. ABE instructors should include more diagnostic assessments and identify reading component skill profiles for each student in the program. This would help target specific reading strengths and areas in need of additional instruction and the determination of appropriate reading intervention.

Limitations

There are several limitations to this study. First, the number of rigorous research studies conducted with adults in ABE programs is significantly limited. Our search resulted in only 17 studies that met the inclusion criteria established for this analysis. This limited number of studies can skew findings. For example, we are not convinced that our estimation of the impact of vocabulary instruction on ABE students reflects results from other studies. A significant negative outlier may have skewed our vocabulary data.

In this analysis, we identified the reading component skills based on an analysis of the research articles included in the study. We classified reading component skills by identifying interventions that targeted Word level instruction, fluency, vocabulary, and comprehension. Under the topic of word-level instruction, we included reading component skills related to phonological awareness, decoding, spelling, word recognition, word attack, word analysis, and letter-word identification. Other researchers have conducted synthesis and reviews by looking at those word-level skills as separate and independent reading component skills. Given the limited number of studies focused on discrete component skills, we chose not to do that. For example, very few studies in this analysis measured phonological awareness. Thus, given such small numbers in some reading component skills, we folded many word-level skills under one heading. Therefore, we could not determine the effects of some of the specific word-level skills. For example, we do not know the effects of decoding on reading comprehension in this study. Finally, our article search cast a reasonably wide net given the limited number of rigorous research studies in adult basic education and reading comprehension. For example, we included studies of ABE students in juvenile detention centers or prisons. Other researchers have chosen to exclude this group from their analysis, given that they are a distinctly different population. In our edit analysis, we included ABE students who were incarcerated or in prison and found, given our heterogeneity analysis, that there is a significant difference between incarcerated and non-incarcerated ABE student reading outcomes. At the same time, we found that reading interventions for incarcerated ABE students did significantly impact reading outcomes in some studies.

Next Steps

After decades of research on efforts to improve reading proficiency for students in ABE programs and findings that have shown chronic, low impacts on ABE student reading outcomes that do not significantly close the achievement gap, perhaps a shift in focus is necessary. Maybe if we identify ABE student's passion for life that is related to a possible career, we could focus on reading instruction designed to support literacy skills in the context of post-secondary education and employment that link the career skills, reading, and language proficiency that meet career path passion with literacy instruction. Given the history of small and limited gains in reading proficiency, a continued focus on education to close the reading proficiency gap may result in lost opportunities responsive to student hopes, expectations, and fears for the future. If low reading proficiency for ABE students is a chronic condition, what tools and instructional efforts can be brought to bear that address these limitations and build on life opportunities related to individual visions of future selves? Providing support for ABE students responsive to student-identified hopes for the future may improve ABE learners' life outcomes.

In short, we might consider shifting support mechanisms and instruction for ABE students from closing the achievement gap to “jumping over the gap” by using assistive technology that accommodates current skill levels and allows the pursuit of one’s passion for life. Research in this area seems essential to understanding and documenting high-impact life outcomes for ABE learners.

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Table 1.*Summary of Effect Sizes and Heterogeneity Statistics for Adult Literacy Interventions*

Literacy Intervention	N	K	ES (Hedges' g)	95% CI	<i>p</i>	Homogeneity	
						Q	I ²
All Studies	17	198	0.168	[0.113, 0.222]	< 0.001	502.82***	60.8%
Word Level	9	91	0.154	[0.087, 0.221]	< 0.001	163.09***	44.8%
Comprehension	13	52	0.210	[0.066, 0.355]	< 0.001	184.91***	72.4%
Vocabulary	3	23	0.059	[-0.096, 0.214]	= 0.436	39.12	43.8%
Fluency	4	14	0.200	[0.111, 0.289]	< 0.001	7.20	0.0%

Note: N = total studies; K = total effect sizes; ES = mean effect size; *p* = *p* value; Q = statistics of test of homogeneity; I² = percentage of variation in ESs across studies; CI = confidence interval

p* < .05. *p* < .01. ****p* < .001.

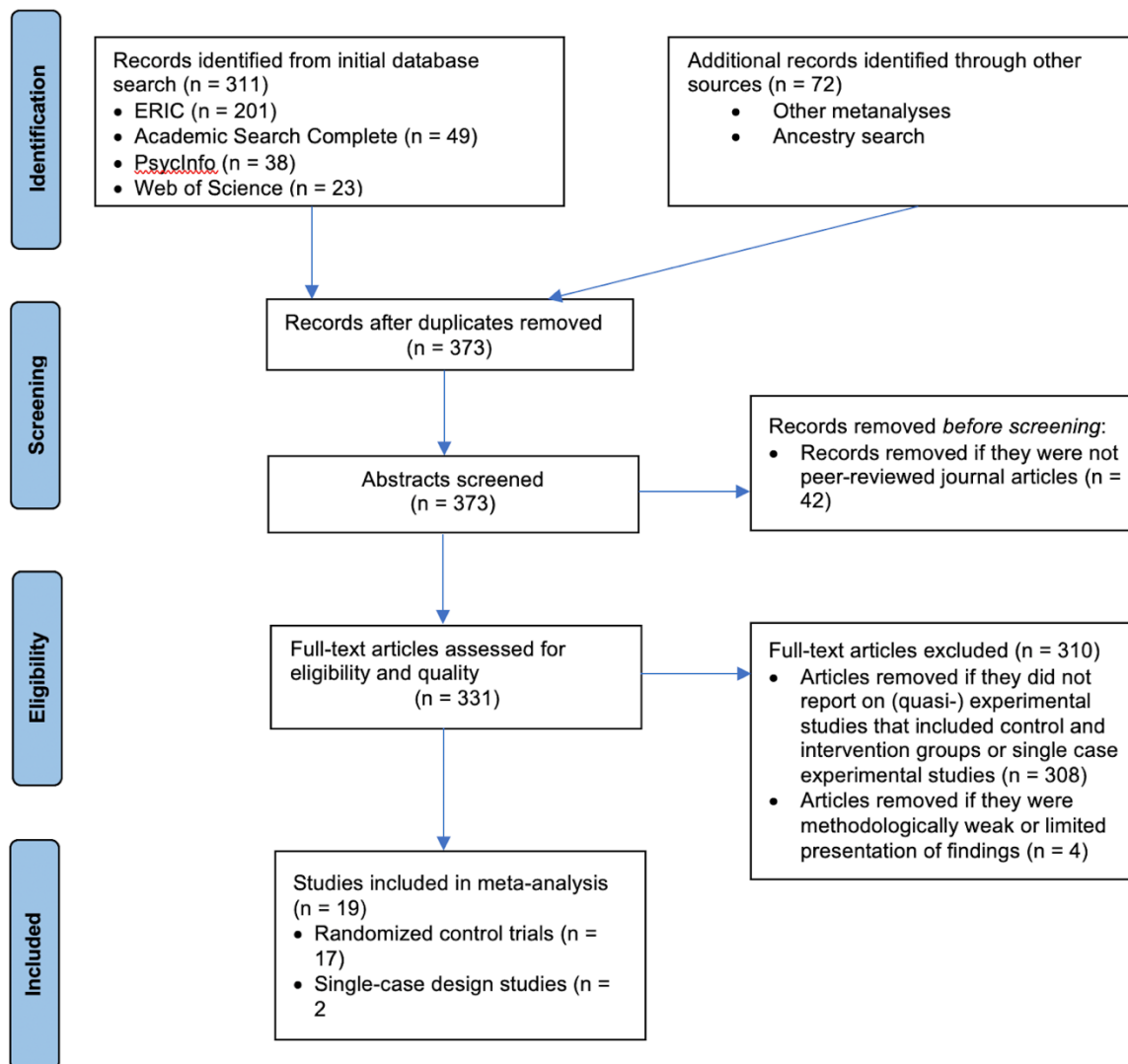
Table 2.*Effect Sizes of Adult Literacy Interventions for Incarcerated vs. Non-Incarcerated Populations*

	K	ES (Hedges' g)	95% CI	<i>p</i>	I ²	<i>p</i> subgroup
Incarceration Status						0.0524
Incarcerated	27	0.099	[0.057, 0.141]	< 0.001	0.0%	
Non-incarcerated	171	0.174	[0.110, 0.237]	< 0.001	65.3%	

Note: K = total effect sizes; ES = mean effect size; *p* = *p* value; I² = percentage of variation in

ESs across studies; CI = confidence interval

p* < .05. *p* < .01. ****p* < .001.

Figure 1.*Reporting Items for Systematic Reviews and Meta-Analyses*

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097