

A Synthesis of the Effects of Correctional Education on the Academic Outcomes of Incarcerated Adults

Deborah K. Reed

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Abstract Most evaluations of the effectiveness of correctional education use the distal outcomes of recidivism and post-release employment as the dependent variables (e.g., Aos et al. 2006; Davis et al. 2013). This synthesis sought to determine the effectiveness of correctional education at improving proximal academic outcomes among incarcerated adult participants. A search of the peer-reviewed literature yielded only six studies meeting the selection criteria published from January 2003 to June 2014. Participants in all studies made educational progress as defined by academic and vocational test scores and course credits. The effect sizes in four studies of adult basic education and one study of vocational education were medium to strong ($g=0.52$ to 2.04). One treatment-comparison study of college education demonstrated negligible negative effects, favoring the typical college program ($g=-0.13$ to -0.19). However, students in both conditions improved their standardized test performance and credit accrual. There were no studies examining general educational development (GED) test preparation. The discussion contextualizes the concerns with methodological rigor and addresses the remaining gaps in the literature.

Keywords Correctional education · Academic outcomes · Adult prisoners

Introduction

On average, inmates in adult correctional facilities reportedly have grade equivalent reading scores of about seventh grade (Shippen et al. 2010). This is little better than the reading abilities of juvenile offenders, which have been found to be at a fourth-grade equivalent (Houchins et al. 2008). Poor reading skills in adolescence are believed to trigger a type of domino effect, first leading to low educational achievement (Churchwell 2009), which predicts school dropout (Neild and Balfanz 2006), which then doubles the chances of becoming incarcerated as an adult (Gottlob 2007). In fact, 60 % of adult inmates responding to a survey did not complete high school or the equivalent prior to becoming incarcerated, and 41 % had dropped out before the tenth grade (Tewksbury and Stengel 2006).

D. K. Reed (✉)

Florida Center for Reading Research, Florida State University, 2010 Levy Ave., Ste 100, Tallahassee,
FL 32310, USA
e-mail: dkreed@frr.org

Educational Options for Incarcerated Adults

In acknowledgment of the history of school failure and concomitant poor educational attainment among a high percentage of inmates, correctional education programs have been made widely available (Foley and Gao 2004; Stephan 2008). Presently, these include adult basic education (ABE), general educational development (GED) test preparation, vocational education—also referred to as career and technical education (CTE), and post-secondary education (PSE). The programs can be distinguished by their different foci. For example, ABE usually targets individuals with very low level literacy and math skills. GED often focuses on individuals who have functional academic skills but have not earned a high school diploma. Instruction targets the content of the test: reasoning through language arts (e.g., analytical reading, essay writing skills), mathematical reasoning (e.g., algebra, geometry, statistics), science (e.g., earth science, life science, physical science, scientific inquiry), and social studies (e.g., economics, geography, government, historical perspective, US history). CTE is intended to prepare inmates for the skilled trades such as construction, plumbing, and welding. Finally, PSE most commonly offers a liberal arts education for earning an associate's degree, but some programs extend beyond that to 4-year and advanced degrees available online or through correspondence.

Policy and legislative changes over the years have altered the educational programs offered to inmates. The Violent Crime Control and Law Enforcement Act of 1994 overturned a section of the Higher Education Act of 1965, which previously had allowed low-income inmates to receive Pell Grants for college tuition while incarcerated. This denial of funding effectively ended access to PSE for many incarcerated adults (Tewksbury and Taylor 1996). Although it did not end the inmates' eligibility, the Higher Education Opportunity Act of 2008 restricted participation in the Grants to States for Workplace and Community Transition Training for Incarcerated Individuals Program to those meeting the following criteria: age 35 or younger; scheduled release or parole date within 7 years; and no convictions for criminal offense against minors, sexually violent crimes, or murder. Other policy changes have affected the content of correctional education more so than program eligibility. The increased rigor of the 2002 revision of the GED test necessitated adding instruction in expository essay writing, and the revised 2014 GED currently is spurring prisons to align curricula to the Common Core State Standards (National Governors Association Center for Best Practices and Council of Chief State School Officers 2010) and add computer literacy training (Lockwood et al. 2013).

Critics of these changes have argued that access to and success in correctional education programs are critical to reducing misconduct during incarceration (Lahm 2009) as well as continued criminal behavior, or recidivism, after release (Batiuk et al. 2005). The orientation towards societal re-entry is central to understanding correctional education as distinguished from traditional schooling. Unlike educational programs for children and non-incarcerated adults in society, evaluations of the effectiveness of correctional education usually have not been based on measurable improvements in the targeted academic or vocational skills. Rather, programs for adult inmates primarily have been evaluated and held accountable for their effectiveness at reducing recidivism, with a related concern of increasing post-release employment (Linton 2005; Second Chance Act of 2007).

Measuring the Effectiveness of Correctional Education

Researchers have noted several challenges associated with using recidivism as the dependent variable: lack of a consistent definition of recidivism, discounting of mediating variables (e.g., age, race, family support, prior criminal history), failure to control for competing programs,

and lack of standardization in the time frame employed for follow-up (Chappell 2004; Lewis 2006; Lockwood et al. 2012; Wilson et al. 2000). Although earlier reviews of the literature have considered the effects of correctional education inconclusive (e.g., Martinson 1974; Whitehead and Lab 1989), findings from recent meta-analyses have suggested that participation in academic and vocational programs significantly lowered the odds of recidivating (Aos et al. 2006; Davis et al. 2013; MacKenzie 2006; Wilson et al. 2000). Most evaluations have considered only participation or involvement in—as opposed to actual completion of—an educational program to be the key indicator. However, some have suggested that completing a program, particularly GED or PSE, was more likely to support re-entry because inmates then would be on more equal footing with non-incarcerated, entry-level job seekers (Batiuk et al. 2005; Brewster and Sharp 2002; Nuttall et al. 2003).

The completion of a correctional education program often has been contingent upon passing a test of the targeted academic or vocational skills. These tests have included the Test of Adult Basic Education (TABE), the GED, vocational skills measures, or final exams in a college course. Certain minimum scores on the TABE also have served as a prerequisite for participation in GED or CTE programs (e.g., Messemer and Valentine 2004), and in lieu of a high school diploma, a passing score on the GED has served as a prerequisite for participation in a PSE program (e.g., Meyer and Randel 2013). Therefore, measures of completion may play a part in the ongoing educational options available to inmates.

Participants in these programs reportedly expect to improve themselves (Tewksbury and Stengel 2006); that is, they have expected to make educational progress such that passing tests and completing courses would be attainable goals as well as stepping stones to success upon release. Nevertheless, some researchers have raised concerns about the preparation of correctional educators, the design of their instruction, and the quality of the overall programs (Lewis 2006; Martinson 1974; Tewksbury and Stengel 2006). Despite calls for studies investigating the educational effectiveness of programs (e.g., Davis et al. 2013; Foley and Gao 2004), a search of the correctional education literature did not identify an existing systematic review of academic outcomes.

Purpose and Research Questions

Rather than examine the distal outcome of recidivism and post-release employment as has been done in recent meta-analyses (Aos et al. 2006; Davis et al. 2013; MacKenzie 2006; Wilson et al. 2000), this review focused on the proximal outcomes of academic improvement and course completion. The present study sought to provide new insights into the merits of correctional education and its potential to support inmates in meeting societal standards for educational success. The research question addressed was: What are the effects of correctional education programs on the academic outcomes of adult offenders?

Materials and Methods

Search Procedures

All procedures were conducted in compliance with American Psychological Association ethical standards. To identify relevant studies, the author conducted a series of searches

utilizing a number of electronic databases (listed alphabetically): *Academic Search Complete*, *Adult Education Quarterly*, *Adult Learning*, *Criminal Justice Abstracts*, *Criminology Full Text*, *ERIC*, *Criminal Justice Periodical Index*, *National Criminal Justice Reference Service (NCJRS)*, *PsycINFO*, *Social Science Abstracts*, and *Sociological Abstracts*. The work of Wilson et al. (2000) guided the selection of databases, with two particular differences. First, the present search included two adult education databases but excluded *Dissertation Abstracts Online*. Only peer-reviewed studies were sought because there have been considerable limitations to the methodological rigor of correctional education studies (e.g., Davis et al. 2013; Lewis 2006), so the peer-review process was considered to provide additional scrutiny of studies' scientific merit.

In multiple searches of the targeted databases, a combination of terms was employed: *adult basic education*, *college*, *correctional education*, *GED*, *general educational development*, *general education diploma*, *general equivalency diploma*, *industry certification*, *secondary education*, *post-secondary education*, *correction**, *incarcerat**, *jail*, *prison*, and *vocational*. More than 65,000 abstracts were identified and evaluated against the eligibility criteria:

1. The study was published between January 2003 and June 2014. GED preparation has been the most common correctional education program (Foley and Gao 2004; Stephan 2008), so the date range was restricted to ensure consistency in the version of this potential outcome measure. Because the previous revision of the GED was released in 2002, 2003 was established as the earliest publication year. The most recent revision of the GED was released in January 2014, so studies published in the first 6 months of that year were accepted.
2. Participants were in adult residential correctional facilities. There was no limitation imposed on the age of participants, so samples with youthful offenders under age 19 were included. However, studies conducted in juvenile justice facilities were excluded.
3. The studies employed an experimental, quasi-experimental, single group pre-/post-test, or single case design. Designs that did not allow for evaluating the impact of a treatment were excluded such as correlation, factor analyses, survey, and program description.
4. The intervention was focused on academic or vocational skills. Excluded treatments were those that addressed art, attention, social skills, emotional or behavioral health, mood, motivation, parenting, personal health, recidivism, self-determination, substance abuse, or therapeutic rehabilitation.
5. The outcomes were academic tests, course credits earned, industry certifications, or vocational tests. In addition, the data provided on these outcomes had to be sufficient for calculating effect sizes.

Only five studies met all inclusionary criteria, and over half of these ($n=3$, 60 %) were published in *The Journal of Correctional Education*. The remaining two articles were published in *Adult Basic Education* and *Community College Review*. Given the predominance of *The Journal of Correctional Education* in this area of work, the publication's tables of contents were manually searched. One additional study meeting eligibility criteria was identified, bringing the total corpus for review to six. Because a small number of studies were identified, the author conducted an ancestral search of the Davis et al. (2013) meta-analysis. This was chosen because it was the most recent and comprehensive review of the correctional education literature, including the grey literature. In addition, Davis et al. rigorously evaluated the quality of all studies and devoted a secondary research question to the academic impact of computer-assisted instruction. Reference chasing yielded no new studies meeting all criteria.

Coding and Reliability

Studies were coded for the characteristics of the participants, characteristics of the instructors, methodological design, intervention implemented, comparison condition (if applicable), and outcomes. Where possible, information was limited to those participants who completed the educational program (i.e., had post-test scores). Although excluding from the analysis those participants without outcome data can bias effect sizes, correctional education suffers high rates of attrition that can be related to transfer, solitary confinement, and early release—rather than simply dropping out (Messemer and Valentine 2004). The interest in this review was determining whether the programs had the potential to improve the learning of adult inmates, so the author documented attrition as is consistent with estimations of study quality (What Works Clearinghouse 2014).

To ensure coding reliability, the author and one other rater independently coded three articles chosen at random. The number of discrepancies divided by the total number of codes indicated only an 8 % disagreement rate, among which there were no substantive disagreements. Rather, differences were usually related to the wording of an intervention description or the amount of detail to include about the setting. Given this level of reliability, the remaining three articles were coded only by the author.

Effect Size Calculation

The effect sizes were calculated in one of four ways, depending on the study design and type of data provided. The author computed Cohen's d (Cohen 1988) for one treatment-comparison study (Meyer and Randel 2013) providing means but an independent t -test value rather than standard deviations, as recommended by Lipsey and Wilson (2001). Although Shippen (2008) compared multiple treatments, data were only reported for the full sample and without pre-test standard deviations. Therefore, an overall Cohen's d was computed by dividing the paired t -test value by the square root of the degrees of freedom (Rosenthal et al. 2000).

For single group studies providing means and standard deviations (Brown and Rios 2014; Young and Mattucci 2006), d was calculated by dividing the pre- to post-test gain in means by the pre-test standard deviation (Dunlop et al. 1996; Lipsey and Wilson 2001). For single group studies not reporting the pre-test standard deviation (Messemer and Valentine 2004; Shaw and Berg 2009), Cohen's d was computed by dividing the paired t -test value by the square root of the degrees of freedom (Rosenthal et al. 2000). For both treatment-comparison and single group designs, d effect sizes were subsequently converted to Hedges' g (Hedges 1981) using the formula suggested by Borenstein et al. (2009). These were interpreted as small if $g=0.20$ – 0.49 , medium if $g=0.50$ – 0.79 , and large if $g=0.80$ or greater (Cohen 1988).

Results

Study Participants and Settings

Table 1 presents information on the adult inmates and the facilities in which they were incarcerated. Although no restrictions were placed on the country in which the research took place, all studies identified were conducted in the USA. Across studies, the number of participants who completed both pre- and post-tests ranged from a low of 27 (Shippen 2008) to a high of 1,088 (Meyer and Randel 2013). All studies began with larger participant counts and experienced attrition of 1 % (Messemer and Valentine 2004) to 64 % (Brown and

Table 1 Study participants and settings

| Study | Number of participants | Age and gender | Race or ethnicity | Other student characteristics | How participants selected | Setting |
|-------------------------------------|---|---|--|---|--|--|
| Treatment-comparison designs | | | | | | |
| 1. Meyer and Randel (2013) | <i>N</i> =1,534 (728 T; 806 control) <i>n</i> =1,088 (512 T; 576 C) Attrition=29 % (30 % T; 29 % C) | 18–35 (<i>M</i> =25.9) Male=76 % Female=24 % | White=45.8 % Black=36.5 % Native American=5.0 % Hispanic=10.8 % Asian/Pacific Islander=2.0 % | Treatment students from 23 different prisons Comparison students from 20 different prisons | Earned high school diploma or equivalent Release date in 1–7 years and no convictions for criminal offense against minor, sexually violent offense, or murder | 43 prisons in six states offering post-secondary education Classroom settings NR |
| 2. Shippen (2008) | <i>N</i> =60 <i>n</i> =27 (number in each treatment NR) Peer tutors=13 Tutees=14 Attrition=55 % (57 % peer tutors; 53 % tutees) | (data below based on original 60 participants, before attrition) 25–64 (<i>M</i> =38) Male=100 % | (percentages below based on original 60 participants, before attrition) African American=60 % European American=40 % | NR | Enrolled in adult basic literacy program at prison and selected by the chaplain Peer tutors had to be reading above the 7th grade level tutees had to be reading below the fifth grade level | Medium-security male prison in Alabama Chaplain facility under the supervision of the chaplain and his trustees |
| Single group designs | | | | | | |
| 3. Brown and Rios (2014) | <i>N</i> =53 TABE language <i>n</i> =40 | (data below based on original 53 participants before attrition) | (percentages below based on original 53 participants before attrition) | 32 % previously incarcerated | Began FLRTW after September 1, 2010 | Residential, therapeutic work release center Facility's computer learning laboratory |

Table 1 (continued)

| Study | Number of participants | Age and gender | Race or ethnicity | Other student characteristics | How participants selected | Setting |
|----------------------------------|------------------------|--------------------------|--|---|--|--|
| 4. Messemer and Valentine (2004) | TABE reading $n=19$ | 23–54 ($M=37$) | Caucasian=57 % Black=36 % | | Scored below 9.0 on any of the TABE sub-tests | |
| | TABE math $n=33$ | Male=100 % | Hispanic=7 % | | Volunteered | |
| | Attrition=25–64 % | | | | | |
| | $N=124$ | 14–50 ($M=20.4$) | African American=85 % | Literacy program students: scored less than 5.0 GLE on TABE reading | Enrolled in either the literacy or ABE programs, but not the special education or GED programs | Closed-security state prison in the Southeastern USA |
| | TABE language $n=117$ | Male=100 % | White=12 % | | | |
| | TABE reading $n=123$ | | Hispanic=2.4 % | | | |
| 5. Shaw and Berg (2009) | TABE math $n=122$ | | Asian=0.8 % | ABE program students: scored greater than 5.0 GLE on TABE reading | | Classroom setting NR |
| | Attrition=1–6 % | | | at pre-test but less than 11.0 on TABE reading, math, or language | | |
| | $N=44$ | Men, 20–63 ($M=35.85$) | Men, Caucasian=44 %, African American=41 % | Spelling stages included within-word and syllables-affixes | Volunteered | County jail in Midwestern state |
| | $n=33$ | Women, 22–47 ($M=32$) | Native American=12 %, Asian=3 % | | Selection based on pre-test spelling scores, personality (facility director reviewed) | Individual pod areas or combined pods in central classroom |
| | Attrition=25 % | Men=85 % | Women, Caucasian=62 % | | compatibility of spelling stage groupings), other programs offered, and room availability | |

Table 1 (continued)

| Study | Number of participants | Age and gender | Race or ethnicity | Other student characteristics | How participants selected | Setting |
|------------------------------|--------------------------------|---|--|-------------------------------|---|--|
| 6. Young and Mattucci (2006) | N=60 n=52 Attrition=13 % | (data below based on 57 of the original 60 participants) 16–50 (M=34.4) Women=100 % | African America=38 % (percentages below based on original 60 participants, before attrition) Caucasian=53.3 % African American=43.3 % Hispanic=3.3 % | NR | In two facilities (five of the seven groups) women were pre-screened by correctional staff based on reading ability, appropriate behavior, and progress in other rehabilitative programs Selection in the other facilities (two of the seven groups) was voluntary | Four different county correctional facilities in New York state Classroom settings NR |

C comparison, *DOC* Department of Corrections, *FLRTW* Florida Ready to Work, *GED* general educational development, *GLE* grade level equivalent score, *N* full sample size, *n* sample after attrition and by subgroup, *NR* not reported, *T* treatment, *TABE* Test of Adult Basic Education, *WRMTR* Woodcock Reading Mastery Test Revised

Rios 2014). This was often specific to an outcome measure, meaning that some participants may have completed particular components of the program but not others.tgroup1

The total age range of participants was wide with the oldest reported as 64 (Shippen 2008) and the youngest reported as 14 (Messemer and Valentine 2004). Youthful offenders, those under the age of 19, were included in three studies (Messemer and Valentine 2004; Meyer and Randel 2013; Young and Mattucci 2006). There was a narrower range in the mean ages of participants: 20.4 (Messemer and Valentine 2004) to 38 (Shippen 2008). Males were the majority (Meyer and Randel 2013; Shaw and Berg 2009) or entirety (Brown and Rios 2014; Messemer and Valentine 2004; Shippen 2008) of the participants in five of the six studies. Women represented less than a quarter of the participants in two studies (Meyer and Randel 2013; Shaw and Berg 2009) and all participants in one study (Young and Mattucci 2006).

In all studies, most participants were described as white (also listed as Caucasian or European American; 12–57 %) or black (also listed as African American; 36–85 %). Relatively small percentages of Hispanic inmates were included in four studies (Brown and Rios 2014; Messemer and Valentine 2004; Meyer and Randel 2013; Young and Mattucci 2006); Native Americans in one study (Shaw and Berg 2009), and Asians or Pacific Islanders in three studies (Messemer and Valentine 2004; Meyer and Randel 2013; Shaw and Berg 2009).

In all studies, participant eligibility was partly determined by a test of ability or educational attainment. Four studies explicitly mentioned criminal history or behavior in the prison as part of the selection criteria (Meyer and Randel 2013; Shaw and Berg 2009; Shippen 2008; Young and Mattucci 2006). Inmates were housed in prisons (Messemer and Valentine 2004; Meyer and Randel 2013; Shippen 2008), county correctional facilities (Shaw and Berg 2009; Young and Mattucci 2006), or a residential therapeutic work release center (Brown and Rios 2014). The classroom environment was described in only half of the studies. This was either a chaplain facility (Shippen 2008), computer learning laboratory (Brown and Rios 2014), or a combination of residential pods and central classrooms (Shaw and Berg 2009).

Instructor Characteristics

The delivery of instruction varied by study design and intervention type (see Table 2). The study comparing PSE programs used designated, remote college instructors for the treatment condition and the typical local college faculty for the comparison condition (Meyer and Randel 2013). The study examining CTE employed the typical instructor who was an experienced plumber (Young and Mattucci 2006). Two studies of basic literacy skill development utilized specially trained peer tutors (Shippen 2008) or researchers (Shaw and Berg 2009) to deliver instruction. Two studies addressing basic literacy and math skills involved computer-delivered instruction (Brown and Rios 2014) or the typical teacher facilitator (Messemer and Valentine 2004). No studies reported the amount of experience instructors had, and their preparation was described in only two studies. One stated that the plumber had masters-level training in vocational education (Young and Mattucci 2006), and the other described how the peer tutors were prepared to deliver the reading program to which they were assigned (Shippen 2008).

Fidelity Monitoring

Fidelity to the educational program can pose a threat to internal validity (What Works Clearinghouse 2014), but the measurement of fidelity was loosely reported if at all (see Table 2). The researchers in the large-scale treatment-comparison study reported observing facilities twice per year but did not indicate coding of program elements (Meyer and Randel

Table 2 Instructor characteristics and fidelity to educational program

| Study | Instructor | Training for instructor | How fidelity monitored |
|--|--|--|--|
| Treatment-comparison designs 1. Meyer and Randel (2013) | T: instructors from Milwaukee Area Technical College (combination of prerecorded lessons and feedback on assignments) with on-site coordinators acting as liaisons | NR for actual instruction of courses On-site facilitators trained on research activities and liaison responsibilities | Research staff observed facilities twice per year \times 3 years (different cohorts each year); criteria NR |
| | C: local college faculty | | Had students complete surveys to rate quality of resources supporting participation and support of instructors, education staff, and peers |
| 2. Shippen (2008) | T1: peers in ABE program reading above seventh grade level on WRMT-R | T1: Peer tutors were trained by researcher to use the Corrective Reading decoding program (word attack, story reading, reading checkouts, and workbook assignments). Emphasis was placed on following the script, error correction procedures, reinforcement, and pacing. The trainer modeled each of the four types of exercises and then asked trainers to model the same. If any errors were noted in the modeling, the trainer stopped the tutor and corrected immediately | Once per month of the 6-month implementation, the researcher observed tutoring sessions and held discussion groups with participants to gain feedback on the progress of the reading program. Tutors received feedback on the fidelity of the program implementation during the first 2 months of implementation |
| | T2: peers in ABE program reading above seventh grade level on WRMT-R | T2: The Laubach literacy peer tutors were trained by the Executive Director of the Central Alabama Laubach Literacy Council. Training was done in 1 day, and tutors had to demonstrate mastery of the Laubach method | |

Single group designs

Table 2 (continued)

| Study | Instructor | Training for instructor | How fidelity monitored |
|---------------------------------|--|--|--|
| 3. Brown and Rios (2014) | Computer-delivered but supervised by a full-time teacher who also delivered feedback to students scoring lower than 50 on a section of the FLRTW program | NR | NR |
| 4. Messmer and Valentine (2004) | Typical instructors in facility | NR | NR |
| 5. Shaw and Berg (2009) | Researchers | NR | The researchers collaborated on planning and delivery of instruction |
| 6. Young and Mattucci (2006) | An experienced plumber | The plumber had masters-level training in vocational education | NR |

ABE adult basic education, C comparison, FLRTW Florida Ready to Work, T treatment, NR not reported, WRM-T-R Woodcock Reading Mastery Test Revised

2013). Rather, the authors provided data from surveys in which students rated the quality of the resources and the support offered by their instructors, education staff, and peers as an alternative means of defining fidelity. For the other treatment-comparison study, Shippen (2008) reported observing tutoring sessions and conducting discussions with participants once per month but only providing tutors feedback on their fidelity during the first 2 months. No level of fidelity or inter-rater agreement was given. The only single group design study providing information relevant to fidelity mentioned the two researchers collaboratively planned and delivered the treatment (Shaw and Berg 2009). No independent coding of fidelity was reported.

Study Characteristics

The features of the studies in this corpus are displayed in Table 3. Two were treatment-comparison studies with random assignment of participants (Meyer and Randel 2013; Shippen 2008). The other four studies were single group designs.

Educational Programs

Four studies focused on basic skills in a manner consistent with ABE in that they targeted inmates whose literacy performance fell below an established cut point (Brown and Rios 2014; Messemer and Valentine 2004; Shaw and Berg 2009; Shippen 2008). Two programs used the TABE for pre-/post-testing and taught the kinds of reading and math skills assessed on that measure (Brown and Rios 2014; Messemer and Valentine 2004). The Brown and Rios study was entirely computer-delivered with teacher feedback provided only to those with low scores on section tests, whereas the Messemer and Valentine study used a combination of teacher- and technology-delivered lessons based on the instructor's determination of what each student needed. The other two ABE studies addressed early literacy, particularly word study (Shaw and Berg 2009; Shippen 2008). Shippen trained inmates to serve as tutors and deliver one of two scripted reading programs, Corrective Reading or the Laubach method. Shaw and Berg directly taught small groups of students organized by spelling ability and using a researcher-designed approach to word study.

Dosage and Duration

Only one study in the corpus did not provide information on the number, frequency, or length of intervention sessions (Meyer and Randel 2013). Three studies had defined durations of eight sessions (16 h; Young and Mattucci 2006), 10 days (20 h; Shaw and Berg 2009), and 48 sessions (72 h; Shippen 2008). The two ABE studies had variable durations to accommodate the time necessary to prepare individual students for the TABE. Messemer and Valentine (2004) reported students spent 32–304 h ($M=115.6$ h) on preparatory lessons, and Brown and Rios (2014) reported the instruction was designed to last 60–70 h with some students needing up to 100 h in order to pass all sections of the curriculum. Where the length of individual sessions could be determined, it was reported as 1.5 h (Shippen 2008) or 2 h (Shaw and Berg 2009; Young and Mattucci 2006).

Treatment Effects

The author calculated ten effect sizes from the data provided in the six studies (see Table 3). Two of those effect sizes were based on comparing an intervention designed by the Correctional Education Association to the typical PSE provided by local colleges, and those

Table 3 Study characteristics

| Study | Assignment of participants | Description of condition(s) | Sessions | Effect sizes ^a |
|---|---|--|--|---|
| <p>Treatment-comparison designs</p> <p>1. Meyer and Randel (2013)</p> | <p>Randomized block design: 43 prisons within 6 states randomly assigned to treatment or comparison</p> | <p>T: Students enrolled in general education CEA/COA courses viewed prerecorded lessons, read from texts, used CD-based materials, and completed assignments and assessments. Assignments and assessments were graded by remote course instructors at Milwaukee Area Technical College. Students could send questions to instructor through on-site liaison</p> <p>C: Typical practice was provided by community or technical colleges and some 4-year colleges or universities (differed by facility). Students took general education courses in an associate's degree program. Some on-site direct instruction was provided by college instructors. Other instruction was delivered through interactive TV, prerecorded audio and video lessons, or self-study correspondence</p> | <p>Number of sessions, NR</p> <p>Frequency of sessions, NR</p> <p>Length of sessions, NR</p> | <p>CAAP, T vs C $g=-0.13$</p> <p>College credits earned, T vs C $g=-0.19$</p> |
| <p>2. Shippen (2008)</p> | <p>Peer tutors matched to tutees and randomly assigned to treatment groups</p> | <p>T1: The Corrective Reading program involved four types of exercises: word attack, story reading, reading checkouts, and workbook. Instruction followed a script and the sequence: modeling the correct response, leading</p> | <p>Number of sessions, 48 (72 h)</p> <p>Frequency of sessions, 2 times/week \times 4 weeks/month \times 6 months</p> | <p>Data not reported by treatment group; no significant difference</p> <p>Full sample (peer tutors and tutees from T1 and T2)</p> |

Table 3 (continued)

| Study | Assignment of participants | Description of condition(s) | Sessions | Effect sizes ^a |
|--|----------------------------|--|---|---|
| Single group designs 3. Brown and Rios (2014) | N/A | <p>students to say the correct answer, and testing students' learning while providing immediate feedback</p> <p>T2: The Laubach method also followed a scripted, explicit approach but began with illustrations that are faded gradually</p> <p>T: FLRTW was built on Career Readiness computer courseware that builds skills in three main areas: applied mathematics, reading for information, and locating information. Students worked at their own pace in a computer lab. Any student scoring lower than a 50 on a particular section met with the teacher, who provided individual feedback on how to improve. That student was then required to repeat the section and retake the section assessment</p> | <p>Length of sessions, 1.5 h (12 h per month)</p> <p>Number of sessions, varied but designed to total 60–70 h; students repeating sections may have spent up to 100 h</p> <p>Frequency of sessions, NR</p> <p>Length of sessions, minimum of 5 h/week</p> | <p>WRMT-R total reading short scale, $g=0.61$</p> <p>TABE language, $g=1.35$</p> <p>TABE reading, $g=1.31$</p> <p>TABE math, $g=1.48$</p> |
| 4. Messemer and Valentine (2004) | N/A | <p>T: The basic skills programs were tailored to the specific educational needs of each student. Teachers independently determined how much time a student spent on a particular learning activity or subject area (reading, math, and language). This may have included independent study, small-group learning, and large-group</p> | <p>Number of sessions, total time spent was 32–304 h ($M=115.6$ h)</p> <p>Frequency of sessions, NR</p> <p>Length of sessions, researchers could not determine how much</p> | <p>TABE language, $g=0.52$</p> <p>TABE reading, $g=0.63$</p> <p>TABE math, $g=.71$</p> |

Table 3 (continued)

| Study | Assignment of participants | Description of condition(s) | Sessions | Effect sizes ^a |
|------------------------------|----------------------------|---|---|---|
| 5. Shaw and Berg (2009) | N/A | <p>lecture as well as videos, educational software, and some distance learning (for advanced students only)</p> <p>7: Students were grouped by stage of spelling ability for instruction. Word study lessons began with review and clarification of spelling patterns and concepts from the previous lesson. Then students sorted word cards and attempted to generalize a pattern before the instructor provided the correct word sort categories. Students recorded the correct groups and patterns</p> | <p>time was spent in each subject</p> <p>Number of sessions, 10 days (20 h; replicated in four sessions with different groups)</p> <p>Frequency of sessions, daily×2 weeks</p> <p>Length of sessions, 2 h</p> | Full sample DSA, $g=1.66$ |
| 6. Young and Mattucci (2006) | N/A | <p>7: Students were divided into seven groups with 3–12 participants in each group. The curriculum included basic theories of plumbing and maintenance as well as problem solving skills. Instruction included demonstrations with fixtures and tools, videos, hands-on practice, and workbook assignments. Students learned to set and repair all the movable parts contained within a toilet and its fixtures</p> | <p>Number of sessions, 8 (16 h)</p> <p>Frequency of sessions, format 1=intermittent over 2 weeks; format 2=twice daily for 2 days in a row×2 weeks; format 3=alternated with construction math and safety training over 4 weeks</p> <p>Length of sessions, formats 1 and 2=2 h; format 3=NR</p> | Written test of plumbing knowledge (instructor-developed): $g=2.04$ |

CAAP Collegiate Assessment of Academic Proficiency, *CEA/COA* Correctional Education Association College of the Air, *DSA* Developmental Spelling Assessment, *FLRTW* Florida Ready to Work, *N/A* not applicable, *TABE* Test of Adult Basic Education, *WRMT-R* Woodcock Reading Mastery Tests Revised

^a Outcome measures reported are standardized unless otherwise indicated

revealed negative effects favoring the comparison condition (Meyer and Randel 2013). Students receiving the typical PSE had a negligible benefit on the Collegiate Assessment of Academic Proficiency ($g=-0.13$) and in earning college credits ($g=-0.19$). The effect sizes were computed with means and the t -tests because standard deviations were not provided. This may explain the lower magnitude effect found for earning college credits than the small negative effect (-0.43) reported by Meyer and Randel.

The effect sizes from all other studies indicate only whether participants made academic gains—not whether the participants improved more than comparison students enrolled in different types of educational programs. This includes the other treatment-comparison design in the corpus because Shippen (2008) reported that there were no significant differences between the two early reading treatments implemented. Overall, the gains demonstrated by all participants taking the Woodcock Reading Mastery Tests-Revised revealed a medium effect ($g=0.61$) of peer tutoring in basic reading skills. It should be noted that Shippen reported that the overall gains demonstrated only a small effect ($d=0.23$), but it was not possible to determine how that effect size was calculated. Without the pre-test standard deviations, the effect size for this review had to be computed from the t -test and converted to Hedges' g .

Three of the single group design studies reported gains with a strong effect of computer-delivered ABE on TABE sub-test performance ($g=1.31-1.35$; Brown and Rios 2014), researcher-delivered word study instruction on Developmental Spelling Assessment performance ($g=1.66$; Shaw and Berg 2009), and CTE on a written test of plumbing knowledge ($g=2.04$; Young and Mattucci 2006). The fourth single group design study reported gains with a medium effect of individualized ABE on TABE sub-test performance ($g=0.52-0.71$; Messemer and Valentine 2004).

Study Quality

Given concerns over the rigor of research on correctional education (e.g., Davis et al. 2013; Lewis 2006; Wilson et al. 2000), studies included in this review were evaluated against proposed quality indicators (Gersten et al. 2005; Raudenbush 2005; What Works Clearinghouse 2014). Table 4 summarizes the elements drawn from Tables 1, 2, and 3. As can be seen, the indicator present in most studies ($n=5$; 83 %) was the use of an outcome measure with reported reliability and validity. The next most common indicators present were an acceptable attrition rate ($n=4$; 67 %) and a thorough description of the treatments ($n=3$; 50 %). The remaining indicators were sporadically present or absent from all studies. Five studies (83 %) evaluated only the pre- to post-test gains of a whole group without comparing those gains to a control condition or accounting for other potential influences on educational progress. In addition, no study measured the fidelity of implementation to provide assurances that the educational programs were being delivered as intended.

Discussion

Interpreting the Effects of Correctional Education

This study sought to determine the effects of correctional education on the academic outcomes of adult inmates. On average, the participants in all six studies reviewed here improved their skills, primarily as measured by standardized tests. The small negative effects associated with the one PSE program (Meyer and Randel 2013) should be interpreted within the context of the treatment-comparison design; that is, the negative effects do not indicate that the participants

Table 4 Quality indicators as reported in studies

| Study | Random assignment | Treatment(s) thoroughly described and replicable | Fidelity measurement | Technical adequacy of measures | Means and SD for computing ES | ES based on treatment-comparison | Attrition less than 30 % |
|-------------------------------|-------------------|--|----------------------|--------------------------------|-------------------------------|----------------------------------|--------------------------|
| Brown and Rios (2014) | NA | - | - | + | + | - | - |
| Messemer and Valentine (2004) | NA | - | - | + | - | - | + |
| Meyer and Randel (2013) | + | - | - | + | - | + | + |
| Shaw and Berg (2009) | NA | + | - | + | - | - | + |
| Shippen (2008) | + | + | - | + | - | - | - |
| Young and Mattucci (2006) | NA | + | - | - | + | - | + |

ES effect sizes, NA not applicable due to using a single group design, + present, - absent

did not progress academically but, rather, that they did not make quite as much progress as other inmates enrolled in other types of PSE programs. Regardless of the type of PSE program in which the incarcerated adults participated, all made gains on average.

The effects of the four ABE programs (Brown and Rios 2014; Messemer and Valentine 2004; Shaw and Berg 2009; Shippen 2008) and one CTE program (Young and Mattucci 2006) were medium to strong ($g=0.52-2.04$). The highest effect size was found in the CTE study for an instructor-developed written test of plumbing knowledge. These types of measures, which are tightly aligned to the content of the intervention, are known to produce higher effect sizes than standardized measures. Despite its lack of equivalence to a standardized test for industry certification, the fact remains that the women in the Young and Mattucci (2006) study accomplished the goal of the CTE program: they learned about plumbing.

Implications of the Study Features

Participants

Participants in the studies were fairly representative of the US prison populations in that more men than women were included, the ages spanned from youthful offenders to those over 60, and the mean age of participants was usually in the 30s (Federal Bureau of Prisons 2014). The studies were less reflective of the racial and ethnic make-up of US prisons due to the low percentages of Hispanic participants—when they were included at all. This somewhat limits the generalizability of the findings and suggests future research is needed to address the effects of correctional education on prison populations with high concentrations of Hispanic inmates.

The sample sizes employed were relatively small with the exception of Messemer and Valentine (2004), who had 117–123 ABE students at post-test, and the large-scale evaluation of PSE conducted by Meyer and Randel (2013) with 1,088 students at post-test. Two studies, both of ABE, experienced high rates of attrition on one or more post-tests (Brown and Rios 2014; Shippen 2008). Attrition has been a problem in ABE and distance learning programs for non-incarcerated adults (Benner and Haas 2001; Moody 2004), and participation rates in correctional education have been described as declining (Davis et al. 2013). Therefore, the fact that four (67 %) of the correctional education studies in this corpus had acceptable rates of attrition is encouraging.

Instruction

Consistent with the findings of Foley and Gao (2004), placement in programs was often based on standardized test scores, and instruction was tailored to each student's needs either through individualized feedback, pacing, or component delivery. The characteristics and preparation of correctional educators were neither well described across the studies nor were the instructors' levels of fidelity to instructional protocols. Hence, it was not possible to draw any conclusions about the relationship between academic outcomes and instructor quality. However, there were some interesting findings that might suggest areas for future exploration.

First, the study with a standardized approach to ABE delivered by computer ($g=1.31-1.35$; Brown and Rios 2014) had higher magnitude effects on the TABE than the study in which teachers had great discretion in tailoring the educational program to students ($g=0.52-0.72$; Messemer and Valentine 2004). On the surface, that seems to support computer-delivered programs as was found by Davis et al. (2013). A closer examination reveals that Brown and Rios had unacceptably high rates of attrition over a shorter duration of time as compared to Messemer and Valentine, who also started with more than double the number of participants. It may be that, overall, inmates are more motivated by the individualized, teacher-delivered

instruction such that they will persist in the program even when having difficulty making progress. Future research is needed to confirm the role teacher support might play in retention and completion, but the findings of Tewksbury and Stengel's (2006) survey indicated higher percentages of inmates reported feeling supported by teachers as compared to computers.

The other interesting finding related to instructor characteristics was that peer tutors in the Shippen (2008) study not only could be trained to assist tutees in developing early reading skills but also improved their own reading abilities in the process of delivering the tutoring. Positive effects for peer tutoring have been found in a synthesis of studies conducted with adolescents (Wexler et al. 2014), so more research might be conducted with adult inmates to better understand the applicability of peer tutoring in correctional education.

Limitations

This review included a very small number of studies and did not systematically search the grey literature. It is possible this introduced publication bias, thus supporting a more positive result (Rothstein et al. 2005). The decision to limit the search to peer-reviewed studies was due to a concern raised by others about the lack of rigor in studies of correctional education (e.g., Davis et al. 2013; Lewis 2006; Wilson et al. 2000). However, the studies in the corpus seemed no more likely to meet the established quality indicators for educational research (Gersten et al. 2005; Raudenbush 2005; What Works Clearinghouse 2014). Notably, most studies did not account for other potential influences on the participants' educational progress.

Here again, context is important to interpreting what would be considered a serious shortcoming if the educational study had been conducted in typical K-12 schools or in studies concerned with distal outcomes. These adult participants were isolated from most sources of incidental learning, beyond an age of experiencing rapid maturation, probably had histories of academic difficulty, and had only certain educational opportunities available to them for limited periods of time. Based on participant selection and eligibility criteria, it would have been highly unlikely for participants simultaneously to be enrolled in competing educational programs. There were only two possible exceptions to this. In the CTE study, Young and Mattucci (2006) noted that some participants were receiving instruction in construction math and safety, but these skills were not the focus of the outcome test of plumbing knowledge. The other possible exception was the Shaw and Berg (2009) study of word study skills that did not report whether participants also were enrolled in any other ABE program typically offered by the facility. However, the intervention delivered by the researchers lasted only 2 weeks, and the outcome measure was a test of spelling and not a broader test of literacy ability.

Experimental studies employing random assignment to treatment and comparison conditions would be more critical to determining the impact of programs on inmates' academic progress if there were multiple educational options competing for the same students and same limited resources. Perhaps this is a bigger issue when examining distal outcomes because inmates simultaneously could be enrolled in drug treatment, cognitive-behavioral treatment, transition assistance, and correctional education (Aos et al. 2006). In that event, it would be important to disentangle which intervention had the biggest impact on reducing recidivism or increasing post-release employment. With a proximal outcome of academic progress, it seems safer to say that any educational improvements are attributable to the one educational program in which the inmate was enrolled. Because inmates reportedly participate in correctional education in order to improve themselves (Tewksbury and Stengel 2006), it may be enough for now to know whether available programs enable inmates to accomplish this goal.

This does give rise to a concern about the types of programs researched. Although GED preparation is believed to be the most common correctional education program (Foley and Gao

2004; Stephan 2008), it was not the focus of any studies in this corpus. In fact, one study excluded inmates enrolled in GED preparation (Messemer and Valentine 2004). Thus, there is little indication of whether efforts to bring inmates to the equivalent of a high school level education have been successful under the standard established by the now defunct 2002 version of the GED. The revised 2014 GED has raised the expectations for academic performance to a level consistent with college and career readiness, yet there is no evidence to guide a possible program redesign. Researchers have suggested that measures of education completion, such as earning a GED or college credits, are important for successful re-entry into society (Batiuk et al. 2005; Brewster and Sharp 2002; Nuttall et al. 2003). Less attention has been given to the gatekeeping role these measures play within prisons. Certain levels of performance or educational attainment are necessary for continual access to educational opportunities, so research on GED and other prerequisite educational milestones is greatly needed.

Conclusions

The past 12 years have seen the publication of very few peer-reviewed, experimental studies of correctional education programs providing sufficient academic outcome data for the calculation of effect sizes. This was surprising, given the increased emphasis placed upon educational effectiveness and college and career readiness in traditional school programs during this same time period (e.g., American Recovery and Reinvestment Act of 2009; No Child Left Behind Act of 2001). The mere six studies reviewed here can be contrasted with the subset of 15 studies published between 2003 and 2011 that were included in the Davis et al. (2013) meta-analysis examining the effects on recidivism and post-release employment. Using our respective corpora, it could be said that for every one study published about academic outcomes, 3.75 studies were published about recidivism or employment. To move the field forward, it may be time to shift the focus from distal outcomes to better understanding the conditions under which inmates can make academic progress while incarcerated.

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