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REVIEW PROTOCOL FOR PREPARING YOUNG CHILDREN FOR SCHOOL VERSION 4.1 (JULY 2020)

This review protocol guides the review of research that informs the What Works Clearinghouse (WWC) *Preparing Young Children for School* practice guide and related intervention reports. The review protocol is used in conjunction with version 4.1 of the *WWC Standards Handbook* and *WWC Procedures Handbook*.

IMPORTANCE OF THE PROBLEM

The new practice guide, *Preparing Young Children for School*, addresses the topic of school readiness by focusing on preparing children for success in kindergarten and Grade 1. This guide will address interventions in early literacy, language, mathematics, social-emotional learning, and self-regulation. This broad focus is intended to encompass the core areas in school-readiness skills that are necessary to support children's success in elementary school and beyond. Numerous studies have documented significant and positive relationships between children's academic, emotional, and social skills at entry to kindergarten and their future achievement across a broad range of outcomes (National Early Literacy Panel, 2008; NICHD Early Child Care Research Network, 2005; Duncan et al., 2007).

KEY DEFINITIONS

Preschool. For this review protocol, preschool is defined as an educational program intended for children between the ages of 3 years and 5 years that focus on pre-academic, social-emotional, and behavioral skills necessary for preparing children for success in elementary school. Preschool may be publicly or privately funded and can vary in duration and structure. For additional details, see the *eligible population*s and *eligible interventions* sections below.

Pre-Kindergarten. Pre-kindergarten (pre-K) is defined as a program that aims to prepare children for school the year before kindergarten. The programs may also be called junior kindergarten or transitional kindergarten. In some states and districts, pre-kindergarten programs such as pre-K3 are available for students two years prior to the start of kindergarten. All these programs are within the scope of the guide.

School Readiness. School readiness is a multi-dimensional construct that is generally defined as the core academic skills and behavioral competencies shown to be necessary for succeeding in school. For the purposes of this guide, these skills and competencies include early literacy, language, mathematics, social-emotional learning, and self-regulation.

ELIGIBILITY CRITERIA

Eligible Populations

Age. This review focuses on children between the ages of 3 years and 5 years who have not yet enrolled in kindergarten. In some instances, children younger than 3 years or older than 5 years of age may be included in the sample. The study is eligible for review if the students are not yet enrolled in kindergarten and:

- the study reports disaggregated results for students in the eligible age range, or
- the mean age for students falls between the ages of 3 years and 5 years.

Types of Students. This review focuses on students who have not been identified as having disabilities. In instances when disaggregated data are not available, the study will be eligible for review if at least 50% of the sample includes children who have not been identified to have any disabilities.

Samples with linguistically diverse students are eligible for review. Linguistically diverse students may also be referred to as students with limited English proficiency, dual language learners, English learners, non-

English speakers, students with English as a second language, language minority, or second language learners. Studies describing samples using any of these terms could be eligible for review.

***Setting*.** The study must primarily be implemented in an educational setting that has a specified curriculum and structure. This could be a pre-K program provided by a public school or a private school. It could also be a preschool program provided at a child-care center or at a family setting. Other settings are also eligible.

The preschool program must have an educational focus regardless of the setting.

***Location*.** The study must be conducted in the United States, its territories or tribal entities, or at U.S. military bases overseas.

Eligible Subgroups

The subgroup analysis will be limited to:

- students with or at-risk for disabilities; and
- linguistically diverse students.

All subgroup analyses will be classified as supplemental findings. If the full sample does not meet WWC standards, then findings from a subgroup may be used as a main finding for the practice guide at the discretion of the Principal Investigator (PI).

Demographic data such as the race, ethnicity, SES, and gender of the full sample will be described in the context section of the reviews.

Eligible Research

Time Frame. The study publication date (print or online) must be between January 1, 2005 and July 31, 2020. Studies must be publicly available and accessible online. The option to extend the timeline of the search may be revisited, perhaps for intervention reports, if time and resources allow.

Type. Dissertations and masters-level theses are not eligible for review.

Designs. The study must include a randomized controlled trial (RCT) or a quasi-experimental design (QED), including regression discontinuity designs (RDD). Studies that use a single-case design (SCD) are not eligible for review under this protocol.

Eligible Interventions

This review will consider studies of curricula, sets of instructional practices, programs, or policies for teaching the target population. Center-based early childhood education (ECE) interventions serving preschool-aged children (i.e., students between the ages of 3 and 5 years) are eligible for review. Interventions in the area of early literacy, language, mathematics, social-emotional learning, and self-regulation are within the scope of this review. The following interventions are beyond the scope of this review:

- interventions intended for children from birth to age 3, including early intervention services provided for children with disabilities, such as those provided under IDEA Part C (IDEA, 2004) for students between birth and age 3;
- interventions that are designed to enhance outcomes primarily for students with or at-risk for disabilities between the ages of 3 and 5 years;
- interventions that provide instruction only via technology;
- interventions that focus only on professional development for educators; and
- interventions that focus only on parent training.

Interventions that focus on other areas of STEM (e.g., science) are eligible for review under this protocol but will not be reviewed for or contribute to the evidence for the practice guide.

Interventions cannot exclusively focus on technology, parent training, or professional development. However, eligible interventions may include a technology component, parent training component, or teacher professional development component while focusing on addressing early literacy, language, mathematics, social-emotional learning, and self-regulation skills for students.

The intervention could be a "bundled" set of instructional practices (e.g., strategies focused on improving literacy as well as behavior).

All reviewed curricula, practices, programs, and policies must be replicable (i.e., can be implemented by those other than the developers of the approach). The following characteristics of an intervention must be described to reliably reproduce the intervention with different participants, in other settings, and at other times:

- proficiencies and skills being targeted;
- approach to enhancing the skill(s) (e.g., strategies, activities, and materials);
- unit of delivery of the intervention (e.g., whole group, small group, individual);
- medium/media of delivery (e.g., teacher-led instruction; software; remote, in-person, or hybrid);
- targeted sample;
- intervention duration and intensity; and
- individuals delivering or administering the intervention.

Curricula. A curriculum is a set of activities, materials, and/or guidance for working with children in educational settings that includes a write-up/description and can be replicated by others based on written guidance, staff training, or technical assistance.

A curriculum may be (a) intended as the primary instructional tool designed to meet children's learning needs in multiple areas, or (b) designed to supplement existing curricular material or practices with differentiated instruction to meet children's learning needs in specific areas. Both types of curricula will be included in this review. Eligible curricula will address early literacy, language, mathematics, social-emotional development, and/or self-regulation.

Practices. Practices must be clearly described and commonly understood in the field and literature. An example of an early childhood education practice is dialogic reading. It addresses children's language skills through interactive shared book reading. Another example is the promotion of positive classroom management practices designed to support development in areas of social behavior and self-regulation.

Policies. A policy is a named condition under which early childhood education programs operate. The policy must be commonly understood in the field and literature and directly affect services in preschool classrooms. Policies may be set by federal, state, or local governments or by the organization providing services. Examples of early childhood education policies include:

- full-day or part-day program operation;
- requirements for teachers to have a bachelor's degree or early childhood certification;
- class size limits or child-staff ratios;
- targeted and universal pre-K programs; and
- lottery-based pre-K enrollment programs.

Programs. A program is a service delivery model that may be associated with a funding stream and includes clear guidelines for implementation. Examples of eligible early childhood education programs include Head Start, Boston Public School preschool program, New York City Pre-K For All, or preschool programs established by states such as New Jersey's Abbott preschool program or Oklahoma's state preschool program.

Eligible Outcomes

Eligible outcome domains are listed below.

Domain Name	Description
Reading & Literacy Related	Includes measures that assess (a) print knowledge (e.g., alphabet letters and sounds, book handling and print conventions, the idea that letters and words convey a message); and (b) phonological awareness (e.g., ability to recognize that spoken words are made up of individual sound parts). Phonological awareness encompasses *phoneme awareness*, the ability to manipulate individual sounds (phonemes) in words (e.g., blending sounds together, segmenting words into their constituent sounds, recombining sounds of words, identifying common sounds in words). It also can include basic phonics instruction, which entails applying students' phoneme awareness and basic knowledge of the sounds made by letters to printed words.
Language	Includes measures that assess receptive and expressive language, vocabulary knowledge, grammar, morphology, and listening comprehension.
Mathematics	Includes measures that assess (a) numeracy (e.g., counting concepts, relational skills, numeral knowledge, arithmetic operations); (b) patterns and classification (e.g., identify patterns, duplicate demonstrated patterns, sort objects); (c) measurement (e.g., use both standard and non-standard units to assess or compare features of objects or people; (d) geometry (e.g., identify shapes and shape attributes like angles and corners, as well as spatial relationships); and (e) general mathematics (i.e., outcome measures that cover two or more of the previous content areas).
Social-Emotional Learning	Includes measures that assess behavioral, social, and emotional competencies underlying school readiness, such as pro-social (or problem) behaviors, social interactions, cooperation, emotional knowledge/understanding, emotion regulation, self-concept, and engagement.
Self-regulation	Includes measures that assess the ability to focus attention and avoid distractions, initiative and motivation for learning, capacity for independent work, goal-orientation and persistence at challenging tasks, working memory, and executive functions associated with inhibitory control and attention set-shifting.
General Knowledge	Includes measures that assess science (e.g., life science, space, earth science), social studies (e.g., history, geography, traditions, cultures), health (e.g., knowledge about the body), etcetera.

All of the domains listed above may not be relevant for each recommendation of the practice guide. Thus, the PI along with the panel will determine which domains are relevant for each recommendation of the practice guide.

Eligible outcome measures may include researcher-developed or standardized measures in any of the domains listed above, as well as teacher reports of student behaviors or skills.

Measures administered after the completion of the intervention are acceptable outcome measures for this guide. To consistently examine effects across different interventions, measures administered closest to the end of the intervention will be considered as the main posttest and be used to determine the level of evidence.

Main and Supplemental Findings. The following outcomes will be included as main findings: (a) posttest measures administered to the full sample closest to the end of the intervention, and (b) the most aggregate form of an outcome measure (rather than individual subscales). A study's overall rating is based only on the main findings.

Measures administered up to six weeks into the kindergarten year are eligible as main findings if no immediate posttest is present.

Therefore, the following outcomes will be included as supplemental findings: (a) posttest measures administered closest to the end of the intervention for the eligible subgroups, and (b) all delayed or follow-up posttest measures. Supplemental findings are not subject to multiple comparison corrections nor aggregated with main findings within the same domain. Supplemental findings will not contribute to the study rating or the evidence for the guide and intervention reports. However, if no main findings meet WWC standards upon initial review, a supplemental finding that meets WWC standards can be substituted in as a main finding. Additionally, when it is not possible to determine the main finding because of incomplete or ambiguous study information, overlapping samples, or other complications, the PI has discretion to identify the main and supplemental findings.

Outcome Measure Standards. The *WWC Standards Handbook Version 4.1* discusses types of outcomes, criteria the outcomes must meet, and how outcomes are reported in Section IV.A: Outcome Requirements and Reporting. In particular, this review follows the requirements stated in the *Standards Handbook Version 4.1* regarding the reliability of outcome measures.

TOPIC-SPECIFIC IMPLEMENTATION OF THE WWC STANDARDS

Attrition Threshold

This review uses the *optimistic* boundary for attrition. This boundary was selected on the assumption that most attrition in studies of early childhood interventions results from exogenous factors not strongly related to intervention status, such as family mobility or absences on days that assessments are given.

Assessing Baseline Equivalence

The *WWC Standards Handbook Version 4.1* states that if a domain has multiple outcome measures and the difference between groups at baseline on one of these measures is outside of the statistical adjustment range, then all measures in the domain do not meet WWC standards. However, given the broad outcome domains in this topic area, this review protocol specifies equivalence be assessed at the outcome level rather than the domain level for **all** eligible outcome domains.

It is not necessary to demonstrate equivalence on student, teacher, or school demographic characteristics for the study to meet evidence standards.

Baseline Equivalence of Individuals. For studies that must satisfy baseline equivalence of individuals, including cluster-level assignment studies being reviewed for evidence of effects on individuals, baseline equivalence must be established per outcome measure for the analytic sample of intervention and comparison groups using:

- a pre-intervention measure of the outcome used in the analysis, or
- another pre-intervention measure from the same domain as the outcome measure, if the pre-intervention measure of the outcome used in the analysis is not available.

Baseline equivalence will be assessed for each analytic sample on an outcome-by-outcome basis. Baseline equivalence for an eligible outcome measure will be assessed using the most closely associated pre-intervention measure. For example, if both pre- and post-intervention measures of outcomes A, B, and C are

available, and the baseline difference for the pre-intervention measure of outcome C exceeds 0.25 standard deviations, then the finding for outcome C would be rated *Does Not Meet WWC Design Standards.* A finding for outcome B, however, could still meet design standards if the authors satisfy the baseline equivalence requirement using the pre-intervention measure of B. The same is true for outcome A.

Statistical Adjustment for Baseline Equivalence. When the baseline difference for a pre-intervention measure is in the statistical adjustment range, between 0.05 and 0.25 standard deviations, the adjustment is only made for the associated outcome measure. For example, if the pre-intervention difference in outcome B requires statistical adjustment, then only the analysis of outcome B must be adjusted.

Considerations for Studies with Cluster-Level Assignment

Baseline Equivalence of Clusters. Baseline equivalence of clusters in the intervention and comparison groups must be satisfied by one of the same baseline measures for assessing baseline equivalence of individuals, and the same statistical adjustment requirements apply. Earlier assessments of the cohort of students in the analytic sample can be used to establish baseline equivalence as long as the measure was collected no earlier than one year from the time of assignment to conditions.

Joiners in Cluster Randomized Controlled Trials (RCTs)

The WWC defines a *joiner* as any student who enters a cluster after the results of random assignment are known to any individual who could plausibly influence a student's placement into a cluster (for example, parents, students, teachers, school/program leadership, or other school staff). The presence of joiners in an analytic sample has the potential to introduce bias into estimates of an intervention's effectiveness.

For this review, in cluster RCTs where the unit of assignment is a group (e.g., teacher or classroom) within a center or preschool, *all joiners pose a risk of bias*. This is because students might be assigned to groups based on knowledge of the intervention. Additionally, parents and families may influence a student's assignment to clusters (e.g., classrooms) because they may have a specific preference for or against the intervention. Therefore, a study that includes at least one such joiner in the analytic sample has a risk of bias from joiners.

In cluster RCTs where the unit of assignment is a center, preschool, or a group of preschools (such as a district), *no joiners pose a risk*, as the intervention is unlikely to influence school enrollment or placement decisions. However, the PI and review team leadership have the discretion to make a decision about which joiners pose a risk of bias. Any time such discretion is exercised, the background and rationale of decisions will be documented.

When the unit of assignment in a cluster RCT does not fall into the two categories described above, the PI and review team leadership have the discretion to decide whether the joiners pose a risk of bias.

PROCEDURES FOR CONDUCTING THE LITERATURE SEARCH

Electronic Database Search

The literature search will be conducted primarily using the public ERIC search engine (https://eric.ed.gov/), which affords relevant results by automatically searching for descriptors and their variants across records without advanced logic or Boolean operators. Therefore, the search term *preschool education,* along with a timeframe of January 1, 2005 to July 31, 2020 and limiters excluding dissertations and studies from outside the United States will be used to conduct comprehensive literature searches using ERIC. Additionally, the Science Direct database of journals published through Elsevier will be searched for articles published between January 1, 2005 to July 31, 2020 using the terms *preschool education* and *early childhood education* in order to include studies that may not be captured in the main ERIC search. This search will include studies categorized as research articles published in the following journals: Early Childhood Research Quarterly, Journal of Experimental Child Psychology, and Journal of Applied Developmental Psychology. All records will be screened for eligible topics, populations, and study designs prior to review.