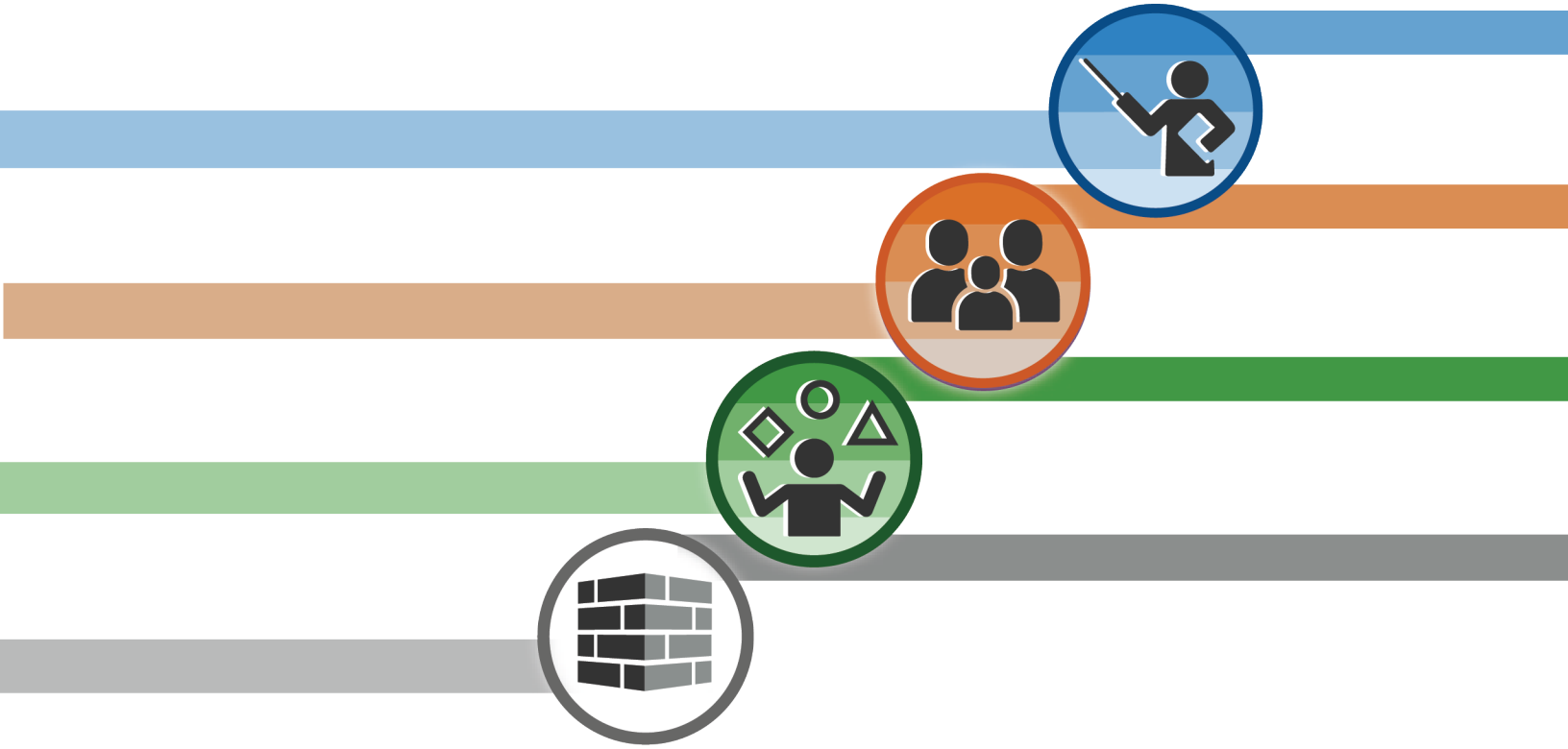
Developing Evidence-based Practice Guidelines for Youth Programs

Technical Report on the Core Components of Interventions that Address Social Competence



DEVELOPING EVIDENCE-BASED PRACTICE GUIDELINES FOR YOUTH PROGRAMS

Technical Report on the Core Components of Interventions that Address Social Competence

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Evidence for Program Improvement was established by The Assistant Secretary for Planning and Evaluation (ASPE) to develop evidence-based practice guidelines for youth programs using a core components approach. Our goal is to better understand the characteristics of effective programs for youth and share guidelines about how to make those programs more effective with those who design, support, and implement them.

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Executive Summary

This report describes and illustrates an approach to using evidence to improve the effectiveness of youth programs, both in terms of how they are designed and how they are implemented. The approach capitalizes on the fact that across the many program environments that offer youth programs (e.g., community, mental health, public health, child welfare settings, schools), there is a great deal of well-controlled research available. Further, there is considerable variability in effectiveness across programs that can be reliably predicted from information reported in the research. Our goal is to better understand the sources of that variability so that we can uncover the characteristics of effective programs and share guidelines about how to make them more effective with those who design, support, and implement such programs. Findings reported here will be used to inform evidence-based guidelines for improving practice.

Background

Our approach to evidence-based practice considers both the programs themselves and aspects of the delivery format, dosage, implementation strategies, delivery personnel, and the like, that may also influence whether a program has positive impacts on youth outcomes. Drawing on a large meta-analytic database of research on youth programs, we identify a profile of program, participant, and implementation features that are empirically related to positive outcomes across the programs represented in the research. We call these program features *core components,* which we group into four domains: (1) factors associated with program approach or content; (2) factors associated with the structure, format, and delivery of the program; (3) factors associated with implementation strategies and problems; and, (4) factors associated with the characteristics of the program participants.

In this report, we focus on a group of selected and indicated prevention programs for youth, all of which provide evidence of program effects on social competence. We group the prevention programs into the following categories based on their general approach to behavior change:

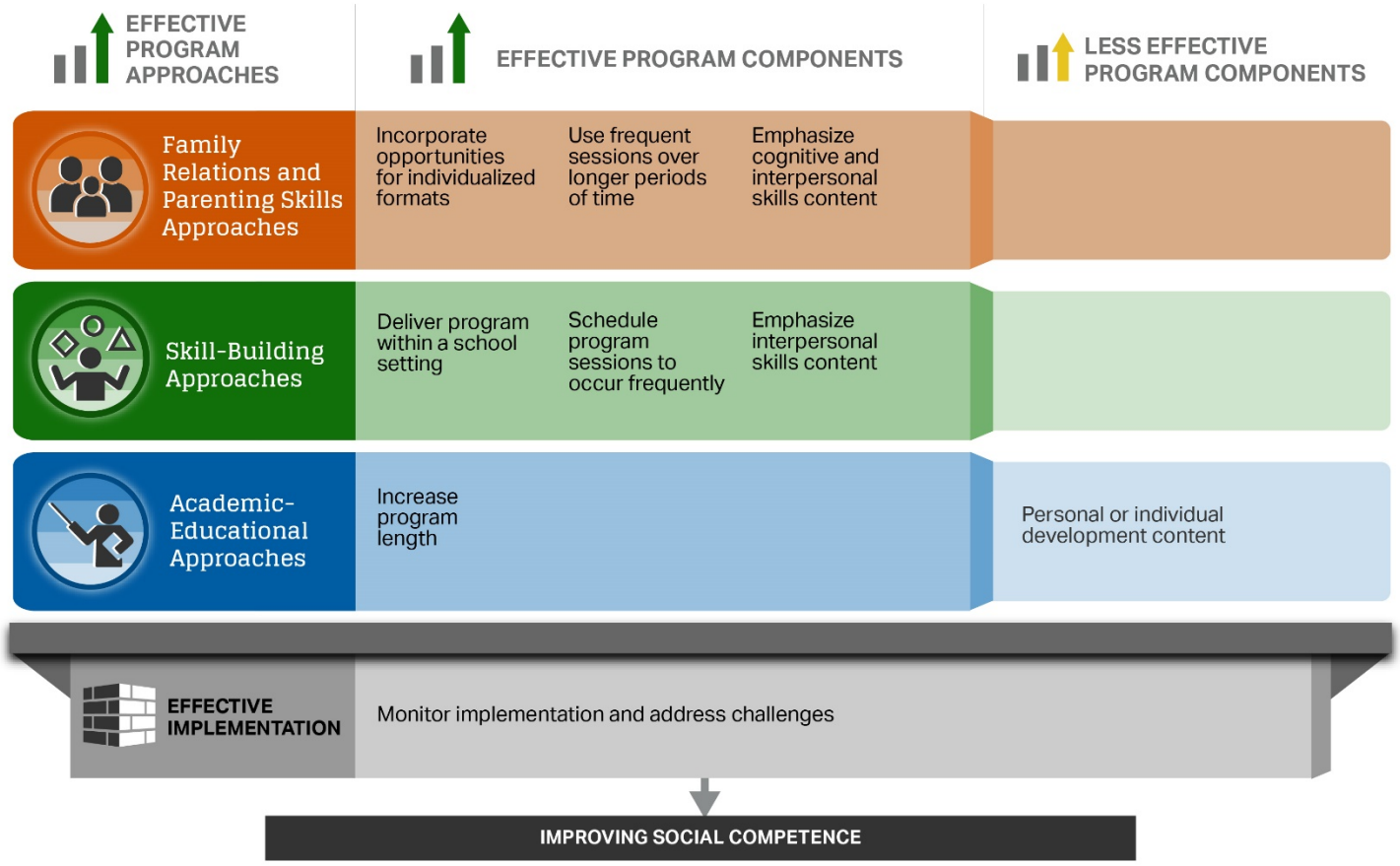
- Family Relations and Parenting Skills
- Relational
- Skill-building
- Academic-Educational Approaches

Findings

Across the diverse prevention programs in the dataset, the overall average program effect on social competence is positive, statistically significant, and represents meaningful effects on the social behavior of the youth who participated in the programs ($\bar{g} = 0.33$, $p < .001$). Expressed in percentage terms, this average effect size of 0.33 means that about 63% of youth participants in prevention programs exhibited better outcomes (improved social competence) than the average comparison group participant. This, of course, is good news because it means that we have robust evidence that the field has developed effective programs. In addition, the four program approaches each exhibit statistically significant impacts on social competencies and each has sufficient variability to explore core components within the group. Our meta-regression analyses focused on discovering the core components that apply separately within each program approach.

Specific Core Components

For each of the four program approaches, we identified specific core components in one or more of our core component domains that were meaningfully associated with program impacts on youth social competencies. The models for three of the approaches (Family Relations and Parenting Skills, Skill-building, and Academic-Educational Approaches) were sufficiently robust to inform practice recommendations. These are summarized in the evidence roadmap below.



1 Introduction

This document is part of a report series designed to illustrate a meta-analytic approach for identifying the characteristics of effective youth programs. The findings reported here will be used to inform evidence-based guidelines for improving practice. An earlier report (Wilson, Lipsey, Aloe, & Sahni, 2020) focused on evidence from studies reporting program effects on externalizing problem behavior. This report focuses on studies reporting program effects on social competence.

The majority of young people in the United States are physically and emotionally healthy, regularly attend and progress through school, and choose to avoid drugs, alcohol, and other illegal behaviors, but there are still large numbers of youth who struggle to stay on track. It is not surprising, then, that there is an extensive array of prevention programs that target youth risk behaviors and/or support positive youth development available. Prevention programs that support social competence, social and emotional learning, conflict resolution, and positive social behavior are available in most schools and communities in the U.S. Downward trends in school violence and victimization rates suggest that widespread programming efforts may be working, but there is still work to be done. For example, bullying is prevalent on school campuses and almost half of U.S. schools reported crimes to the police (Musu, Zhang, Wang, Zhang, & Oudekerk, 2019).

Over the last several decades we have seen a clear movement in many service environments (from juvenile justice to mental health to education) towards evidence-based practice as a way to improve on existing programming efforts (e.g., APA 2006; Kratochwill & Shernoff, 2003; Raines, 2008; Sacket, 1996; Schiele, Weist, Youngstrom, Stepahn, & Lever, 2014). The most common approach to evidence-based practice focuses on identifying distinct model programs that have demonstrated positive impacts and then advocating that these programs be scaled up and delivered widely in the field. Such model programs usually have a brand name (e.g., Coping Power, Good Behavior Game), a manual, standardized models of service delivery, and, often, implementation supports. Model programs typically receive the "evidence-based" designation as a result of at least one rigorous study that demonstrates a statistically significant positive impact on an outcome of interest. Registries such as Blueprints for Healthy Youth Development (https://www.blueprintsprograms.org/), the What Works Clearinghouse (https://ies.ed.gov/ncee/wwc/), and Crime Solutions (https://www.crimesolutions.gov/) review the research on candidate programs and provide listings of those that meet their evidence standards. More recently, federal tiered evidence schemes and some federal grant funding have begun emphasizing the use of model programs (e.g., the Office of Adolescent Health's Teen Pregnancy Prevention program, the Every Student Succeeds Act, the Department of Education's Education Innovation and Research program).

Although the evidence behind model programs is often well-designed and well-conducted, there are several drawbacks to the focus on fully articulated program models: (1) generalizability may be questionable given that there are typically only a few studies of a program that assess its impact; (2) local flexibility or adaptation may be limited because the program must be implemented with fidelity to the original model to achieve similar results; and (3) service providers or program staff may be reluctant to drop their current practice to adopt something new due to cost, resistance to change, contractual obligations, local support for the current program, and the like. This latter point is critical. The model programs approach can be helpful for decision-makers who are considering adopting a new program (and look to evidence registries to select a well-supported model) or when selecting a program from among several options. **But, evidence registries offer less help to agencies that are already providing programs and services and may be interested in using evidence to *improve* their current practices.**

Indeed, a large majority of programs in operation in the field are not model programs at all, but rather homegrown or locally developed programs or adaptations of model programs. In some cases, the proportion of model programs used in actual practice is estimated to be less than 10% (see Becker, Smith, Jensen-Doss, 2013; Garland et al., 2010 for mental health; and, Lipsey, 2018 for juvenile justice). All programs (whether model programs or homegrown) are comprised of a set of specific approaches and procedures. **Examining the specific components that comprise a program—rather than the program as a whole—has the potential to identify components that are effective and inform programming for much greater numbers of youth than model- or registry-based approaches.**

This report describes the technical aspects of an alternative approach to using evidence to improve the effectiveness of youth programs. The approach is designed to provide evidence-based guidance and strategies for improving current practice and is intended to be broadly applicable across a range of settings and agencies. It capitalizes on the fact that across the many program environments that offer youth programs (e.g., community, mental health, public health, child welfare settings, schools), there is a great deal of well-controlled research available—some on model programs, but mostly on diverse locally-developed programs.

This approach to evidence-based practice applies a different way of thinking about evidence—a way that considers both the programs themselves and aspects of the delivery format, dosage, implementation strategies, delivery personnel, and the like, that may also influence whether a program has positive impacts on youth outcomes. Drawing on a large meta-analytic database of research on youth programs, we identify a profile of program, participant, and implementation features that are empirically related to positive outcomes across the programs represented in the research. We call these program features *core components*. This paper focuses on identifying such core components for prevention programs that target youth social competence. In the next phase of this work, we will draw on the contributing research studies to flesh out full descriptions of the core components we identify, and use the results as the basis for practice guidelines that allow agencies and providers to assess how well their services stack up against what the evidence says are effective practices and can inform providers' efforts to improve services to align more closely with the evidence. Rather than expecting practitioners to consider model program evidence that may be disconnected from their work context, the approach described here can provide a pathway for providers' to reflect on their current efforts in light of core components. Doing so might, in turn, guide their decisions around which practices to keep, which to adopt, and which to target for improvement.

We illustrate this approach with a group of prevention programs for youth, all of which provide evidence of program effects on social competence. In the next section, we describe the meta-analytic database that serves as the evidence base and define the programs, participants, and implementation features included in the database. We then discuss the overall effectiveness of these youth programs for improving youth social competencies as a lead-in to our analytic approach. Following that, we present the core components we identified from this meta-analysis. A series of appendices provides additional technical details about the meta-analytic database, our analytic approach, and sensitivity analyses.

2 Characteristics of the Youth Programs

To identify core components, we use a group of youth programs from a large meta-analytic database that includes the results of hundreds of randomized and quasi-experimental studies of youth programs of relatively high quality. This database is a compilation of seven separate meta-analyses of youth programs conducted by two research teams (see Appendix A) developed with the goal of exploring the variability of intervention effects across studies of diverse programs for children and youth. The programs in the database are designed for children and youth and aim to have beneficial effects on many different outcome domains related to social and cognitive development, school performance, family and peer relations, antisocial behavior, and positive youth development generally. Within any of these domains, there is a great deal of variability in the effects of programs that can be reliably predicted from information reported in the studies. A better understanding of the sources of that variability could uncover the characteristics of effective programs, information that has the potential to be informative for those who design, support, and implement such programs about how to make them more effective.

The process of identifying core components begins with selecting an outcome domain and then assembling the programs that report program impacts in that domain from the larger database. Working backwards from an outcome domain, rather than selecting a set of programs for analysis, means that we can focus on a variety of program approaches, providers, participants, implementation practices, and settings, whatever has the greatest potential to improve the outcome of interest. This focus on any actionable feature of a service environment that might improve a high-priority outcome is intended to inform guidelines that are maximally useful to a range of audiences.

For this report, we selected social competence as the outcome domain of interest. We define social competence broadly to include competencies related to developing and maintaining relationships with other people, including communication and listening skills, assertiveness, cooperation, conflict resolution skills, and social awareness. Programs that target social competence are diverse and common in both school and community settings, so the audience for practice guidelines in this area may be large.

From the larger database, we selected the 144 programs that report program impacts on social competence. The 144 programs consist of *selected* (i.e., strategies targeted toward *at-risk subpopulations*) or *indicated* (i.e., strategies for *individuals* considered to be at risk of problems) prevention programs in which the youth participants are at risk for or are already experiencing social, behavioral, academic, or family difficulties. Many of the 144 programs report program impacts on multiple measures of social competence. The analyses we report below make use of these multiple estimates. The outcomes themselves are diverse; they include measures of social skills, sociability, peer relations, interpersonal competence, assertiveness, and cooperation. Most of the measures are collected via surveys or questionnaires reported by teachers, parents, or the children and youth participating in the research. Appendix A includes additional descriptive detail about the outcomes and Appendix B provides information about our analysis methods.

The record for each study we selected for analysis provides estimates of program impacts (i.e., standardized mean difference effect sizes) for the major study outcomes, along with extensive descriptive details about each study's program, providers, participants, and implementation activities. These descriptive data are our potential core components.

2.1 The Program Approaches

The prevention programs include school-based, community-based, and afterschool programs that employ a wide range of intervention strategies, including those that directly target youth social behavior (e.g., social problem solving skills, conflict resolution) and those focused on other targets such as parenting or academic difficulties that may also influence social competence. Using an inductive approach in which we carefully reviewed the descriptions of each program provided in the studies, we sorted the programs into six broad categories representing different program approaches, most with several subcategories. Although we have grouped programs into mutually exclusive categories, many programs are multi-dimensional and often include elements from more than one of our approach categories. We aimed to place each program in the approach category that best reflected its predominant content. To capture the multi-dimensionality of programs, our database also includes the configuration of individual elements that make up each program; we describe these elements in Appendix A. The six program approaches are described below. For each approach, we note the number of studies and number of impact estimates (or effect sizes) that contributed to the analysis.

Family Relations and Parenting Skills (30 studies; 50 impact estimates). Programs in this group aim to increase desirable positive behaviors and decrease undesirable negative behaviors among youth by improving parent-child relationships and/or promoting positive parenting behaviors. Family relations and parenting skills approaches are intended to change youth behavior primarily by enhancing or improving parental or family influences on youth. This group of approaches includes three variations in our database:

- Approaches with a family focus. Parent(s) *and* children receive services in these programs, with perhaps others as well (e.g., teachers); parent(s) and children may receive services together or separately. Content focuses on family functioning and parent-child relationships, but parenting skills may also be covered.
- Approaches focused on parent training. Parent(s) receive services with their children not involved or only minimally involved; others (e.g., teachers) may also be involved. Content focuses primarily on parenting skills and behaviors.
- Approaches with a child coping focus. Children (and perhaps others, e.g., teachers) receive services, but not parents. Content focuses on strategies for supporting children coping with family issues, such as divorce.

Relational (24 studies; 50 impact estimates). Programs in this group aim to influence desirable positive and undesirable negative behaviors and their precursors (e.g., attitudes, motivation, insight, perceptions, and behavioral intentions) via positive and supportive relationships with others, including mentors or counselors, and possibly also with peers involved in the same program. There are two variations of mentoring and counseling approaches in our database:

- Relatively open-ended or eclectic counseling/mentoring. Programs do not clearly follow a particular therapeutic orientation or process; content is often tailored to the needs of individual youth.
- Counseling/mentoring with a particular therapeutic orientation. Programs generally have a structure, guiding principles or goals, or issue that colors the process.

Skill-building (67 studies; 155 impact estimates). Programs in this group aim to enhance youth interpersonal skills, improve youth responses to challenging interpersonal interactions with peers, teachers, and other adult authority figures, and train youth to manage social interactions and/or their internal affective/executive processes and responses in ways that reduce the potential for conflict and promote positive relationships. Most programs involve training as well as the opportunity to practice learned skills. There are three variations in the database:

- Approaches that emphasize both interpersonal skills and affective/executive processes or responses. Programs include interpersonal skills elements such as learning social problem solving steps or identifying and diagnosing emotions or conflict situations and elements focused on controlling or managing affective/executive responses such as anger and impulsivity.
- Approaches that emphasize mainly interpersonal skills. Programs focus largely on social problem solving training and identifying and diagnosing emotions or conflict situations.
- Approaches that emphasize mainly affective/executive processes or responses. Programs focus mainly on training that addresses affective/executive processes or responses including anger, impulsivity, and the like that may inhibit or prevent positive social interactions.

Behavior Management (5 studies; 9 impact estimates). Programs in this group aim to shape or modify problem behavior and precursor/risk behaviors via manipulation of rewards and punishments. Programs employ a variety of mechanisms including incentives, disincentives, and behavioral contracting to incentivize appropriate social behavior, modify problem behaviors, or modify the precursor behaviors that are risk factors for problem behavior.

Academic-Educational Approaches (16 studies; 25 impact estimates). Programs in this group aim to improve school performance, school engagement, and academically-oriented behavior. Academic performance and social competencies are correlated and school-based social and emotional learning programs have been shown to impact academic performance (Durlak et al., 2011). Thus, although social competence might not be the primary focus, programs with an academic or educational focus sometimes provide collateral benefits on youth social competence by promoting positive youth development in general. Many programs in this group also include elements focused on problem behavior and/or social competence. There are three variations in the database:

- Programs that focus on changing the school environment or structure. Programs include alternative schools, schools-within-schools, career academies, and the like. Many programs involve smaller class sizes, personalized interactions with teachers, and additional academic and behavioral supports for youth.
- Tutoring and remedial academic programs without a vocational component. Programs focus largely on academic supports for youth, often with goals of improved attendance and high school completion, though they may include other support services such as counseling.
- Tutoring and remedial academic programs with an employment or vocational component. Programs in this group also provide academic supports, but focus mainly on career awareness and development. Programs may include vocational- or career-oriented courses, internships or other employment experiences, and community or volunteer service.

Deterrence (2 studies; 2 impact estimates). Programs in this group aim to change behavior via sanctions, intensive oversight or monitoring, consequences, or punishment. Manipulation of punishments or negative consequences, or illustrating potential negative consequences, is expected to modify behavior directly. Programs may include prosocial or positive youth development aspects, but the primary focus is on deterrence.

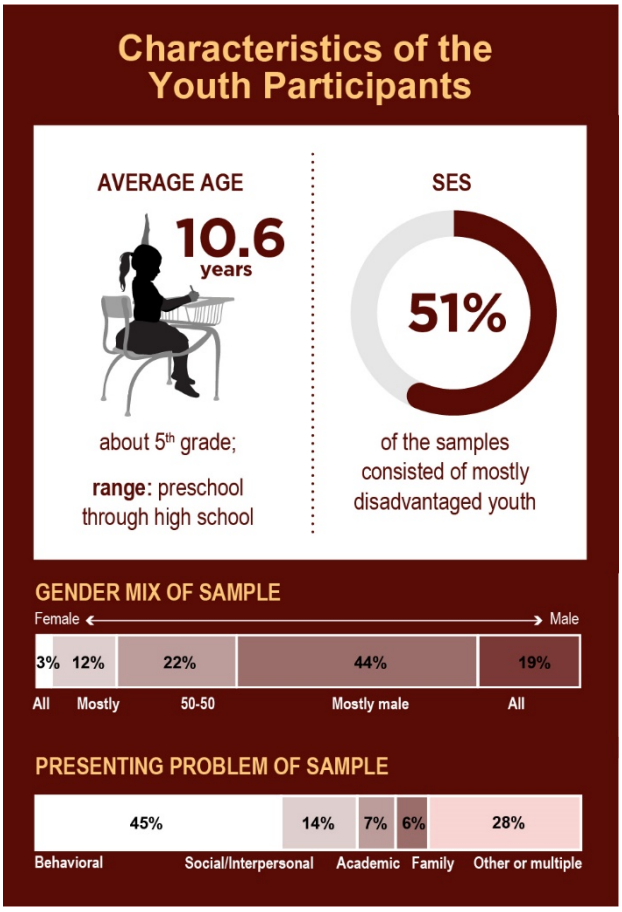
The behavior management approaches, deterrence approaches, and the programs that focus on changing the school environment or structure (within Academic and Educational Interventions) were dropped from the analyses because so

few programs were included in these categories (*k* = 8 studies; *n* = 13 impacts). Thus, four approach categories were carried through our analyses: family relations and parenting skills, relational, skill-building, and the remaining academic and educational programs, which all focus on tutoring or academic supports.

2.2 Other Program Features and Characteristics

The prevention programs in the database also vary in their staffing, configurations, resources, and program length, among other features. We have grouped these potential core components into four domains: program content, program structure, implementation strategies and outcomes, and participant characteristics. Details about the studies included in the meta-analytic database, the protocol for coding the potential core components, and descriptive statistics for program content, structure, and implementation for all 144 programs are included in Appendix A.

- **Program content**
  - Program approach. Each program was coded into one of the program approach categories we described above.
  - Program content elements. The content of each intervention was additionally described with a series of non-mutually exclusive elements.
- **Program structure**
  - Program setting
    - Location: rural, suburban, urban, mixed. Country, region of US
    - Service delivery setting: classroom, school, afterschool, community
  - Program standardization
    - Program protocol: has manual, program guide
    - Lesson plans: specified number of sessions and session content vs. less structured
  - Program dosage
    - Duration in weeks from beginning to end
    - Frequency of sessions per week
  - Program personnel
    - Delivery personnel: researcher, specialist, teacher, layperson, etc.
  - Delivery format: individual, group, classroom
  - Delivery complexity: counts of formats, provider types, and settings
- **Implementation strategies and problems**
  - Provider training: training indicated or not
  - Provider supervision: evidence of supervision, consultation, or coaching of providers during the intervention
  - Implementation problems: whether implementation difficulties reported or not
- **Participant characteristics (see Box on the right)**
  - Gender mix: male proportion of participant sample
  - Average age of participant sample
  - Age range of participant sample
  - Socioeconomic status
  - Presenting problem: Externalizing, internalizing, peer, family, school, etc.



2.3 Characteristics of Study Methodology

In addition to the program and participant features, the meta-analytic database also includes details about the methods and research practices used in each study. These variables are not themselves potential core components that might inform practice because they do not represent substantive features of the program or its participants and are not actionable in practice settings. However, study methods and research practices are associated with program impacts in ways that may obscure statistical relationships that might be important for understanding program effects. For example, imagine that we observe smaller effects from research studies in which comparison groups receive some minimal level of service than from studies in which comparison groups receive no services at all. It makes sense that studies in which comparison groups receive more services might appear to have smaller impacts, but the contrast between intervention and comparison groups is not an actionable feature of a typical service environment. Thus, our analyses must address the influence of research methods, so that we can identify the actionable core components without them being obscured by methods. We conduct these analyses as sensitivity analyses and present the results in Appendix C.

3 Effects of Youth Programs on Social Competence

Before we identify the profile of core components associated with positive program impacts, we first look at the overall effects of youth programs on social competence and the distribution of those effects. Across the 144 programs and 291 impact estimates in the dataset, the overall average program effect on social competence is positive, statistically significant, and represents meaningful effects for the youth who participated in the programs ($\bar{g}$ = 0.33, p < .001). Expressed in percentage terms, this average effect size of 0.33 means that about 63% of youth participants in prevention programs exhibited better social competence than the average comparison group participant.

In the results below, we will use a threshold of .10 effect size units as an indicator of a relatively meaningful difference, rather than relying solely on statistical significance. The random effects models we use in all analyses are conservative. If we focus only on statistical significance from such models, we may overlook findings that are substantively meaningful. This is no standard way of judging whether an effect size difference is substantively important. It can depend on the particular context or on nature of the outcome (e.g., small changes may be meaningful for some outcomes, but larger changes may be required for others to be considered meaningful) and also depends on the overall distribution of effects. We selected the .10 threshold because it represents about a third of the mean effect size or an approximately 4 percentage point difference in social competence. That is, subtracting or adding .10 from our mean effect size of 0.33 translates into a range of 59%-67% of program participants exhibiting better social competence than the average comparison group participant. This may seem small, but taken in the context of the number of school children who are victims of bullying, for example, we think a 4% change could represent a visible impact on a school climate. More important for our purposes than the average treatment effect, however, is the considerable variability we observe in the effect sizes across studies.

3.1 Interpreting the Effect Size Variability

In the random effects meta-analysis models we use throughout this report, we use several indicators to provide different perspectives on the variability or heterogeneity in the effect sizes (Borenstein, Hedges, Higgins, & Rothstein, 2009). For the 144 programs and 291 impacts we analyze here, there is evidence of heterogeneity (Q = 740, p <.05; I^2 = 63.26%; $\tau^2_{between} = .09$; $\tau^2_{within} = .03$). The Q statistic is an index for the total amount of study-to-study variation observed. A statistically significant Q indicates that there is more study-to-study variation than can be explained by within-study sampling error. The I^2 statistic is derived from the Q and reflects the proportion of the total effect size variation that can be attributed to the heterogeneity between studies, and when there are multiple effect sizes per study, between the effect sizes within each study. I^2 values greater than 50% are generally considered to indicate sufficient effect size variability to warrant exploration of study characteristics associated with larger or smaller effects. Because we have more than one impact per study on social competence, we can separate the I^2 statistic into the portion effect size variation attributed to between study variation (49.12%) and the portion attributed to variation between effect sizes within each study (14.14%). We also have two τ^2 statistics, which estimate the between-study and within-study variances, respectively. Together, these variance estimates tell us about the range of effects we observe both within and between studies. The square root of $\tau^2_{between}$ is often used to describe the range of the between-study effects. For example, for a mean effect size of 0.33 and a $\tau_{between}$ of .30 (the square root of our $\tau^2_{between}$ of .09), we can expect that about 95% of the distribution of between-study effects will fall between -0.26 and 0.92 (i.e., 0.33 +/- 1.96*$\tau_{between}$), a rather large range.

The discovery that the variability between studies is greater than the variability within studies means that: (a) the studies with multiple outcomes find the impacts on those outcomes to be relatively similar; and (b) we have sufficient variability between studies in observed outcomes to explore the influence of our potential core components, all of which are characteristics at the study level. That is, the variability we observe, mostly between studies, *motivates and provides the ideal circumstance for us to identify the factors that characterize the most effective programs.* Our next step is to identify those factors.

4 Analytic Approach to Identifying Core Components

4.1 Purpose

We noted above that the meta-analytic database contains descriptive detail about the programs and participants involved in the research, which we categorized into four broad domains: program content, program structure, implementation strategies and problems, and participant characteristics. This information, along with the observed variability in program impacts, is what permits us to identify core components across the range of studies reporting outcomes on social competence.

4.2 Meta-regression

Specifically, we use a form of regression analysis tailored to meta-analytic data to identify the profile of program, participant, and implementation features that are empirically related to the effect sizes for social competence across the diverse program implementations represented in the studies in this body of research. This analysis estimates the relative contribution of each potential core component for predicting the largest program impacts. We use multi-level meta-regression models to account for the dependencies that result when studies are permitted to contribute multiple effect size estimates to an analysis (Konstantopoulos, 2011; Viechtbauer, 2010).

As with any multiple regression analysis, correlated independent variables (or moderators) can obscure the relationship of any one independent variable with the outcome. That is, many of the potential core components in the meta-analytic database are not just related to program effectiveness; they are also related to each other. For example, the academically-focused programs tend to be longer than the skill-based approaches; when both program approach and program duration are included in an analysis and we see a large relationship between, for example, duration and program effectiveness, we do not know whether it is the longer duration that produced the impact, the academic programs (which happen to be longer), or some combination of the two. Many of the potential core components do co-occur in the programs in the database. Our analytic strategy is, therefore, designed to isolate the independent influence of each potential core component as much as possible. For the analysis, we sought to select variables that were not strongly correlated with each other. In addition, we performed the analyses separately for the four program approach categories to better isolate the core components that might interact with the approach categories if all programs were analyzed together.

Our analyses for this report focus on core components that are specific to each of the four program approaches. In our first report on core components for programs reporting externalizing behavior problems outcomes (Wilson, Lipsey, Aloe, & Sahni, 2020), we found that there were three general core components that were associated with program impacts across all programs regardless of approach. These were all facets of implementation and included implementation quality, delivery complexity, and provider training or supervision. In the analysis for this report on social competence outcomes, we examined the same general core components using the full dataset and found that these core components were not reliably associated with program impacts when all program approaches were combined. This may be because the social competence dataset is smaller and has less overall variability than the externalizing behavior problems dataset we used in our first report, or because the general core components interact with the program approaches such that the relationships are not consistent across the approach categories.

The analyses of core components for this report were, therefore, performed separately for each of the four program approaches we selected for analysis. Separating programs in this way helps us better disentangle the core components that are related to each other. This separation also means that the practice guidelines we develop from the analysis can be tailored to the approach categories so that practitioners can more easily find guidance that is relevant for the kinds of programs they implement. We focused on potential core components in the four domains of program and participant features captured in the meta-analytic database: implementation strategies and problems, program content, program

structure, and participant characteristics, thus including the general core components from our externalizing problems analyses in each of the specific analyses we constructed for social competence.

4.3 Sensitivity Analysis

In the final stage of our analysis, we explore whether any methodological confounds exist and whether these confounds might offer alternative explanations for the substantive findings. These analyses are presented in Appendix C.

Additional technical details about our analytic approach, including our procedures for weighting, estimating models, handling missing data, and the process for selecting core components, are presented in Appendix B.

4.4 Limitations of the Analytic Approach

All of the analyses we report in this paper are exploratory and correlational. Even though individual impact estimates from the studies, especially those that use randomized designs, are causal estimates, findings from meta-regression analyses are not. Our analyses examine the empirical relationships between potential core components and observed findings, but that does not mean that a particular variable or core component directly caused the findings we observe. **That is, any core component we identify should not be thought of as having a direct causal impact on social competence, but rather as a factor that practitioners should consider.** This is not specifically a limitation of the analytic approach, but it is important to communicate this complexity. In addition, although we present significance tests for our findings, we are more interested in the magnitude of the regression coefficients than in their statistical significance. The random effects models we use to estimate our models are rather conservative (as is appropriate for a diverse dataset like ours), but that means that we are less likely to find statistical significance, even when the relationships are substantively meaningful. Our analyses are intended identify the features that characterize the most effective programs as a way to inform practice, not to make causal statements about the effects of any particular variable or set of variables.

5 Core Components for Different Program Approaches

Exhibit 1 shows the mean effect sizes and heterogeneity statistics for the program approach groups. All four program approaches have statistically significant impacts on social competence. Each also has sufficient variability to explore core components within the group, as evidenced by the statistically significant Q-statistics, and sufficient between-studies variability to support analysis (as indexed by the relatively large I^2-between and τ^2-between values).

Exhibit 1. Mean Effect Sizes and Heterogeneity Statistics for the Program Approach Categories

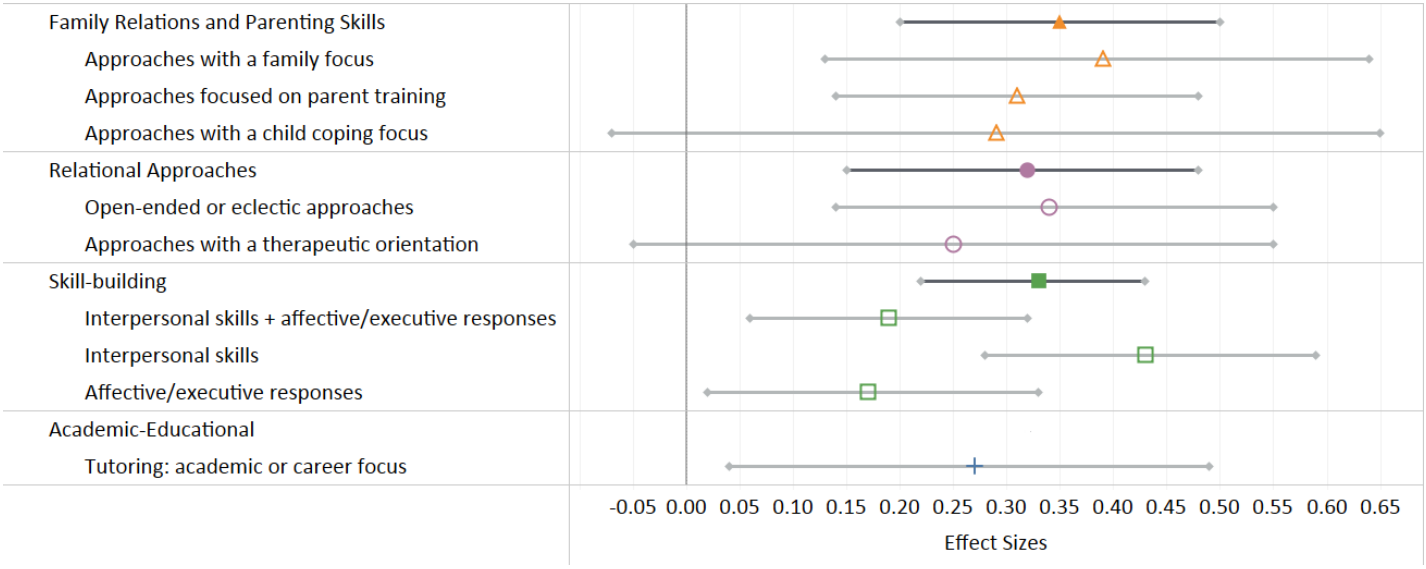
	n	*k*	Mean Effect Size	se	LCI	UCI	τ^2 (between)	τ^2 (within)	Q	I^2 (total)	I^2 (between)	I^2 (within)
Family Relations and Parenting Skills	***50***	***30***	***0.35****	***0.08***	***0.20***	***0.50***	***0.12***	***0.00***	***131****	***69.6***	***69.6***	***0.0***
Approaches with a family focus	25	15	0.39*	0.13	0.13	0.64	0.19	0.00	87*	79.5	79.5	0.0
Approaches focused on parent training	14	10	0.31*	0.09	0.14	0.48	0.02	0.01	16	31.9	21.2	10.7
Approaches with a child coping focus	11	5	0.29	0.18	-0.07	0.65	0.13	0.00	27*	68.7	68.7	0.0
Relational	***50***	***24***	***0.32****	***0.08***	***0.15***	***0.48***	***0.10***	***0.02***	***136****	***71.1***	***57.6***	***13.5***
Open-ended or eclectic approaches	36	17	0.34*	0.10	0.14	0.55	0.11	0.03	93*	74.8	58.4	16.3
Approaches with a therapeutic orientation	14	7	0.25	0.15	-0.05	0.55	0.12	0.00	36*	62.4	62.4	0.0
Skill-building	***155***	***67***	***0.33****	***0.05***	***0.22***	***0.43***	***0.08***	***0.07***	***344****	***56.7***	***30.7***	***26.0***
Interpersonal skills + affective/executive responses	42	21	0.19*	0.07	0.06	0.32	0.00	0.06	76*	46.2	1.4	44.8
Interpersonal skills	99	37	0.43*	0.08	0.28	0.59	0.12	0.08	231*	58.8	34.4	24.4
Affective/executive responses	14	9	0.17*	0.08	0.02	0.33	0.00	0.00	9*	0.0	0.0	0.0
Academic-Educational Approaches	***23***	***15***	***0.27****	***0.11***	***0.04***	***0.49***	***0.13***	***0.03***	***79****	***77.7***	***63.4***	***14.3***
Tutoring or academic support	23	15	0.27*	0.11	0.04	0.49	0.13	0.03	79*	77.7	63.4	14.3

Note. k = number of studies; n= number of effect sizes; se = standard error of the estimate; LCI and UCI are the lower and upper 95% confidence intervals; the τ^2 estimates reflect the between- and within-studies variance; I^2 estimates the proportion of total variance due to heterogeneity; the total, between-studies, and within-studies estimates are shown; Q is an index of the total amount of study-to-study variation.
*p<.05

The average impacts for the four broad approach categories that are the focus of our core components analyses (family relations and parenting skills, relational, skill-building, and academic-educational approaches) are similar to each other and the confidence intervals overlap (Exhibit 2). No single approach category seems to have appreciably larger or smaller effects on social competence than any other. In addition, the approach sub-categories within each of the main approach groups also tend to exhibit similar impacts on average, in spite of the conceptual differences between them.

In spite of the similarity in overall effects across the four approaches, there are practical reasons to explore the core components separately for each program approach; that is, practice guidelines might be more useful if separated by program approach. In addition, the variability within each approach category is sufficient to explore specific factors that are associated with improved outcomes for those approaches. Finally, because of differences in study characteristics associated with particular approaches (e.g., academic-educational programs tend to be longer than skill-based programs), we may be better able to see the influence of specific core components if we conduct the analyses separately by program approach.

Exhibit 2. Mean Effect Sizes and Confidence Intervals for the Program Approach Categories



For each program approach group, we began our exploratory analysis by examining the descriptive statistics for the potential core components in four domains: implementation strategies and problems, program content, program structure, and participant characteristics. The specific configurations of core components were tailored to the individual approach categories because not all features were present or had sufficient variability within a category.

- Implementation strategies and problems: provider training or supervision and indications of problems with implementation
- Program content: approach sub-category and the most common content elements in the approach category
- Program structure: duration of intervention and frequency of treatment; individualized vs. group; classroom-based, pullout, community-based; delivery personnel; use of lesson plans; delivery complexity
- Participant characteristics: age, presenting problem, gender and race/ethnicity mix, and SES

We selected potential core components from the set of available variables using several strategies. First, we examined the bivariate relationships of each potential core component with effect size; those with near zero relationships were not explored further. In addition, we used a form of random forests analysis tailored to meta-analytic data to assist with variable selection. Random forests analysis is a technique for variable selection that helps identify potentially influential variables for analysis while taking into consideration the interrelationships and interactions among those variables (Hapfelmeier & Ulm, 2013; van Lissa, 2018). Variables correlated with effect size that were not highly skewed (i.e., only a small number of programs in the group exhibited that feature) were entered into a random forests analysis. Those that were identified as important in that analysis were explored in our meta-regression models. To arrive at the final meta-regression models, we removed variables selectively from the meta-regression models that did not have meaningful independent relationships with the effect sizes. As we mentioned above, we chose .10 effect size units as the threshold for a meaningful difference. Thus, binary core components were considered to have a meaningful relationship with effect sizes if their independent contribution to predicting effect sizes (the regression coefficients, or *b*s, in the models) was 0.10 or larger. We also used the .10 threshold for core components indexed on a standard scale (i.e., with a mean of zero and a standard deviation of 1) such as delivery complexity. The .10 threshold was also considered meaningful when associated with a 1 point change on core components that were ordinal. More details about the specifics of our analysis are included in Appendix B.

5.1 Core Components for Family Relations and Parenting Skills Approaches

The key features of the family relations and parenting skills approaches are shown in Exhibit 3 along with the correlations between selected features and effect sizes. Programs in this group averaged about 16 weeks in duration, typically offering sessions once a week. Most programs were community-based (rather than school-based). Delivery personnel were varied with no single dominant category. Although all programs had at least one family or parenting focused content element, a non-trivial number of programs also included content for youth, including personal development, interpersonal or social skills, problem solving, and attribution retraining.

Exhibit 3. Characteristics of Family Process and Parenting Skills Approaches (*k*=30)

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality				**Approach Subcategory**		
Explicit problems	6	(20%)	-0.60	Family focus	15	-0.07
Possible problem, no problems or no mention of problems	24	(80%)		Parent training focus	10	0.01
Delivery Complexity				Child coping with family	5	-0.03
Number of different settings	1.5	(0.86)	0.01	**Content Elements**		
Number of different delivery personnel	2.4	(1.22)	0.21	Relaxation skills training	1	
Number of different formats	1.8	(1.02)	0.27	Appropriate classroom behavior	2	
Delivery complexity factor	0.0741	(0.62)	0.35	Problem solving sequence	9	0.15
Provider Training				Empathy	1	
Yes	23	(77%)	0.04	Attribution retraining	9	0.09
Provider Supervision				Moral development training	0	
Yes	18	(60%)	-0.01	Self-statements to inhibit impulsiveness or promote positive behavior	2	
Dosage				Interpersonal, social skills	12	0.17
Duration (weeks)	16.2	(14.85)	0.13	Conflict resolution	3	
Frequency (sessions/week)			0.30	Assertive communication skills	4	
Less than weekly	1	(3%)		Personal development	11	-0.16
1x/week	22	(73%)		Identifying, understanding feelings	5	-0.18
More than 1x/week	7	(23%)		Trusting relationship with caring adult	0	
Delivery Setting				General personal or social support	5	0.18
Classroom-based	4	(13%)		Behavioral coping skills for anger/aggression	0	
School-based pullout	5	(17%)	-0.03	Problem solving sequence for anger/aggression	4	
Community-based	21	(70%)	-0.06	Attribution retraining for anger/aggression	0	
Delivery Personnel				Self-statements to inhibit anger/aggression	0	
Mixed personnel	9	(30%)	-0.12	Angry behavior cycle	2	
Specialist staff	9	(30%)	-0.30	Parent skills training	21	0.12
Researcher, students, laypersons, and others	12	(40%)		Parent functioning	4	

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Delivery Format				Social support, building support network	5	-0.42
Multiple subjects, with provider	7	(23%)	-0.13	Family communication skills	13	-0.19
Group of parents/families, with provider	12	(40%)	-0.25	Engagement with child's school	5	-0.11
One-on-one with provider	7	(23%)		Information provision for families	3	
Mixed formats	4	(13%)		Academic, educational	4	
Lesson plans				School structure	0	
Yes	21	(70%)	0.00	Service learning	1	
Participant Characteristics				Self-sufficiency skills	0	
Presenting Problem=behavior	16	(53%)	0.10	Health education and promotion	0	
Age	9.5	(3.86)	-0.03	Provide basic needs	1	
Gender mix			0.09	Recreational	3	
No males (<5%)	0	(0%)		Employment, vocational	0	
Some males (<50%)	4	(13%)		Case management, service brokerage	1	
50-60% male	6	(20%)		Parenting skills for youth	0	
Mostly males (>60%)	15	(50%)		Unspecified	0	
All males (>95%)	5	(17%)		Violence and drug use education	1	
SES			0.42			
Low	11	(37%)				
Middle	10	(33%)				
Upper middle	9	(30%)				

Note. k=number of studies. The correlations shown in the table are bivariate inverse variance weighted correlations between the potential core component and the effect size. For binary variables (e.g., implementation quality) the correlation is reported for only one direction. For categorical variables, the correlations reported are for the category shown with all other values on the variable in the reference category. The correlations are not reported for variables with small numbers of cases.

The final core component meta-regression model for the family process and parenting skills approaches is shown in Exhibit 4. Recall that potential core components were considered for inclusion based on their relationships with effect size (see Appendix C) and were retained in the model if the coefficients met our threshold for meaningful differences. Six specific core components and one interaction were independently associated with effective family process and parenting skills approaches based on the thresholds for meaningful relationships we discussed earlier. Although only two of the potential core components were statistically significant, the magnitude of each of the relationships with the effect sizes suggests that a change on any of the core components in the model is associated with a meaningful difference on the outcome.

Exhibit 4. Core Components for Family Process and Parenting Skills Approaches (*k* = 30; *n* = 50)

Core Components	b (se)	
Intercept	0.42 (0.13)	***
Delivery format: one-on-one	0.35 (0.16)	*
Program duration (> than 10 weeks)	-0.15 (0.17)	
Session frequency (> than 1x/week)	-0.27 (0.27)	
Duration x Session frequency interaction	0.12 (0.35)	
Implementation: Explicit or suggested problems	-0.60 (0.16)	***
Content element: Cognitive restructuring	0.13 (0.13)	
Content element: Interpersonal, social skills	0.24 (0.17)	
Model Statistics		
Q-model	25.74	***
Q-residual	58.78	*
τ^2 (between)	0.05	
τ^2 (within)	0.00	
I^2	48.76%	

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

Programs in which services were delivered in one-on-one formats tended to show greater improvements in social competence than those that used group formats. We also observed an interaction between program duration and program frequency (i.e., number of sessions/week). On average, programs that were longer than 10 weeks and programs that delivered services more than once a week showed smaller impacts than shorter programs or programs that met once a week. **However, the interaction between the two dosage variables suggests that longer programs with frequent contact had the largest impacts on social competence. Programs in which implementation problems were identified tended to show smaller impacts than those in which problems were not mentioned, as would be expected. Two content elements were associated with improved impacts on social competence: (1) programs that included one or more elements related to cognitive restructuring such as the cognitive problem solving sequence, attribution retraining, or self-statements to promote self-regulation showed larger impacts on social competence relative to programs without such elements; and (2) programs that included specific interpersonal or social skills training elements showed larger impacts on social competence than programs without such elements.**

The Q-model and Q-residual values for the family process and parenting skills approaches are both statistically significant. This indicates that the core components in the model account for a significant amount of the heterogeneity we observe between studies, but there is remaining variability between studies that is not accounted for by the core components we have to work with. Although variability remains, the configuration of core components for the family process and parenting skills approaches have potential to guide practice towards better outcomes.

5.2 Core Components for Relational Approaches

The key features of the relational approaches are shown in Exhibit 5. Programs in this group are, on average, almost two months longer than those in the previous group of family process and parenting skills approaches. The majority of programs were school-based in which youth are pulled out of class for services, in contrast to the previous group which contained primarily community-based programs. A third of the programs delivered services primarily in a one-on-one format. The youth participants were also considerably older than those in family relations and parenting skills group. Interpersonal, social skills and personal development were common content elements.

Exhibit 5. Characteristics of Relational Approaches (*k* = 24)

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality				**Approach Subcategory**		
Explicit problems	7	(29%)	-0.20	Open-ended	17	-0.23
Possible problem, no problems or no mention of problems	17	(71%)		Orientation	7	0.23
Delivery Complexity				**Content Elements**		
Number of different settings	1.2	(0.51)	0.14	Relaxation skills training	0	
Number of different delivery personnel	1.6	(1.06)	-0.23	Appropriate classroom behavior	4	
Number of different formats	1.6	(0.77)	-0.14	Problem solving sequence	1	
Delivery complexity factor	0.085	(0.52)	-0.15	Empathy	0	
Provider Training				Attribution retraining	0	
Yes	14	(58%)	0.42	Moral development training	0	
Provider Supervision				Self-statements to inhibit impulsiveness or promote positive behavior	0	
Yes	13	(54%)	0.22	Interpersonal, social skills	14	0.01
Dosage				Conflict resolution	0	
Duration (weeks)	23.3	(25.62)	-0.23	Assertive communication skills	0	
Frequency (sessions/week)			-0.15	Personal development	16	-0.19
Less than weekly	1	(4%)		Identifying, understanding feelings	5	0.05
1x/week	14	(58%)		Trusting relationship with caring adult	6	-0.20
More than 1x/week	9	(38%)		General personal or social support	3	
Delivery Setting				Behavioral coping skills for anger/aggression	0	
Classroom-based	3	(13%)	-0.21	Problem solving sequence for anger/aggression	2	
School-based pullout	13	(54%)	0.45	Attribution retraining for anger/aggression	0	
Community-based	8	(33%)	-0.23	Self-statements to inhibit anger/aggression	0	
Delivery Personnel				Angry behavior cycle	1	
Researcher or student	5	(21%)	0.07	Parent skills training	1	
Specialist staff	9	(38%)	-0.18	Parent functioning	0	
Regular teachers, laypersons, and others	10	(41%)		Social support, building support network	1	
Delivery Format				Family communication skills	2	
One-on-one with provider	8	(33%)	0.29	Engagement with child's school	1	
Multiple subjects, with provider	12	(50%)	-0.26	Information provision for families	0	
Mixed formats	4	(17%)		Academic, educational	4	

	Frequency (%) or Mean (sd)		Correlation with Effect Size
Lesson plans			
Yes	6	(25%)	0.14
Participant Characteristics			
Presenting Problem=behavior	10	(42%)	-0.01
Age	12.6	(3.84)	-0.13
Gender mix			0.07
No males (<5%)	4	(17%)	
Some males (<50%)	1	(4%)	
50-60% male	7	(29%)	
Mostly males (>60%)	6	(25%)	
All males (>95%)	6	(25%)	
SES			-0.25
Low	12	(50%)	
Middle	10	(42%)	
Upper middle	2	(8%)	

	Frequency	Correlation with Effect Size
School structure	0	
Service learning	1	
Self-sufficiency skills	0	
Health education and promotion	0	
Provide basic needs	1	
Recreational	4	
Employment, vocational	1	
Case management, service brokerage	2	
Parenting skills for youth	0	
Unspecified	0	
Violence and drug use education	0	

Note. k=number of studies. The correlations shown in the table are bivariate inverse variance weighted correlations between the potential core component and the effect size. For binary variables (e.g., implementation quality) the correlation is reported for only one direction. For categorical variables, the correlations reported are for the category shown with all other values on the variable in the reference category. The correlations are not reported for variables with small numbers of cases.

Exhibit 6 shows the meta-regression model for the relational approaches. The analysis identified five core components for these programs. **One-on-one formatted programs were associated with larger outcomes than group formats. Programs delivered in schools (which were largely pull-out rather than classroom based) were also associated with better outcomes than programs delivered in community settings. Delivery complexity was associated with smaller improvements in outcomes.** This was a composite variable created from a principal components factor analysis of three variables: number of different implementation settings (e.g., classroom, home, playground), number of different types of delivery personnel (e.g., teachers, laypeople, program specialists), and number of different formats (e.g., group, one-on-one). We interpret the delivery complexity factor as more of an implementation issue than an indication that multi-faceted or multicomponent programs are less effective. In terms of practice implications, we think this finding suggests that it is critical for program implementers to consider delivery complexity in their particular setting and context and pay special attention to ensuring that program organizers have the support and infrastructure required to implement complex programs should they wish to do so. **In addition to delivery complexity, programs for which study authors explicitly mentioned implementation problems were generally less effective.**

Exhibit 6. Core Components for Relational Approaches (*k* = 24; *n* = 50)

Specific Core Components	b (se)	
Intercept	0.30 (0.39)	*
Delivery format: one-on-one	0.25 (0.23)	
Delivery setting: school-based (vs. community)	0.38 (0.22)	†
Delivery complexity	-0.003 (0.22)	
Implementation: Explicit problems	-0.14 (0.21)	
Average age of sample	-0.02 (0.02)	
Model Statistics		
Q-model	6.93	
Q-residual	101.64	***
τ^2 (between)	0.10	
τ^2 (within)	0.02	
I^2	69.07%	

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

One participant characteristic was associated with better outcomes; relational approaches tended to be more effective with younger samples. Practically, a finding like this is not intended to suggest that programs should focus solely on younger children. Rather, program personnel may have a better sense of what impacts they can expect when serving youth at different age or grade levels.

Note, however, that the Q-model in Exhibit 6 is not statistically significant. Although we identified core components that have meaningful relationships with the effect sizes for the relational approaches, differences among the programs remain that are not accounted for by the core components available in our data. Since the models give a somewhat less than full accounting of the possible sources of differential effects for programs in this approach category, the resulting practice guidelines may have correspondingly less potential influence for guiding program improvements. That is, there may be other unknown factors associated with beneficial (or even harmful) outcomes that could potentially overshadow the factors in the models.

5.3 Core Components for Skill-building Approaches

The key features of the 67 studies of skill-building approaches are shown in Exhibit 7. Skill-building approaches average about 16 weeks in duration and tend to be more frequent than the family process and parenting skills and relational approaches. Skill-building programs are also delivered across classroom, pull-out, and community settings. The one-on-one format is also less common in this category. Academic researchers as delivery personnel are common. Delivery complexity is lower than the average across all of the programs, but many programs do have multiple content elements.

Exhibit 7. Characteristics of Skill-building Programs (*k* = 67)

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality				**Approach Subcategory**		
Explicit problems	7	(10%)	-0.13	Cognitive and affective	21	-0.24
Possible problem, no problems or no mention of problems	60	(90%)		Cognitive	37	0.28
Delivery Complexity				Affective	9	-0.07
Number of different settings	1.3	(0.85)	-0.22	**Content Elements**		
Number of different delivery personnel	1.6	(0.87)	-0.30	Relaxation skills training	5	-0.07
Number of different formats	1.4	(0.98)	-0.23	Appropriate classroom behavior	7	0.00
Delivery complexity factor	-0.148	(0.53)	-0.22	Problem solving sequence	33	-0.17
Provider Training				Empathy	11	-0.07
Yes	39	(58%)	-0.19	Attribution retraining	10	0.07
Provider Supervision				Moral development training	0	
Yes	32	(48%)	-0.37	Self-statements to inhibit impulsiveness or promote positive behavior	4	
Dosage				Interpersonal, social skills	40	-0.03
Duration (weeks)	16.4	(18.86)	-0.28	Conflict resolution	3	
Frequency (sessions/week)			-0.01	Assertive communication skills	14	0.18
Less than weekly	2	(3%)		Personal development	21	-0.19
1x/week	28	(42%)		Identifying, understanding feelings	17	0.00
More than 1x/week	37	(55%)		Trusting relationship with caring adult	1	
Delivery Setting				General personal or social support	1	
Classroom-based	14	(21%)	-0.02	Behavioral coping skills for anger/aggression	5	-0.23
School-based pullout	38	(57%)	0.22	Problem solving sequence for anger/aggression	13	-0.33
Community-based	15	(22%)	-0.21	Attribution retraining for anger/aggression	1	
Delivery Personnel				Self-statements to inhibit anger/aggression	8	-0.11
Researcher or student	28	(42%)	0.22	Angry behavior cycle	8	-0.05
Specialist staff	15	(22%)	-0.15	Parent skills training	9	-0.27
Regular teachers, laypersons, and others	24	(36%)		Parent functioning	1	
Delivery Format				Social support, building support network	2	
One-on-one with provider	5	(7%)		Family communication skills	9	-0.25
Multiple subjects, with provider	60	(90%)	0.09	Engagement with child's school	2	
Mixed and other formats	2	(3%)		Information provision for families	4	

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Lesson plans				Academic, educational	5	-0.25
Yes	53	(79%)	-0.13	School structure	0	
Participant Characteristics				Service learning	0	
Presenting Problem=behavior	31	(46%)	-0.31	Self-sufficiency skills	0	
Age	10.3	(2.85)	0.07	Health education and promotion	0	
Gender mix			-0.18	Provide basic needs	1	
No males (<5%)	1	(1%)		Recreational	0	
Some males (<50%)	9	(13%)		Employment, vocational	0	
50-60% male	16	(24%)		Case management, service brokerage	1	
Mostly males (>60%)	30	(45%)		Parenting skills for youth	0	
All males (>95%)	11	(16%)		Unspecified	0	
SES			-0.01	Violence and drug use education	0	
Low	33	(49%)				
Middle	14	(21%)				
Upper middle	20	(30%)				

Note. k=number of studies. The correlations shown in the table are bivariate inverse variance weighted correlations between the potential core component and the effect size. For binary variables (e.g., implementation quality) the correlation is reported for only one direction. For categorical variables, the correlations reported are for the category shown with all other values on the variable in the reference category. The correlations are not reported for variables with small numbers of cases.

The meta-regression model for the skill-building approaches is shown in Exhibit 8. Six core components with meaningful relationships with program impacts were identified. **Delivery in classrooms and pull-out delivery in schools showed larger impacts than programs delivered in community settings. Longer duration programs tended to exhibit smaller impacts on social competence, but programs with more frequent delivery exhibited larger impacts.** In general, longer programs tended to be less frequent (i.e., were delivered once a week or less). **The finding that longer programs are less effective may be due more to the lower frequency than the overall duration. Programs that explicitly mentioned implementation problems also were less effective. Many skill-building approaches included multiple skills-based elements, but those including one or more of the following were particularly effective: interpersonal, social skills, conflict resolution, assertive communication skills, and identifying and understanding feelings.**

Exhibit 8. Core Components for Skill-building Approaches (*k* = 67; *n* = 155)

Specific Core Components	b (se)	
Intercept	-0.03 (0.17)	
Delivery setting: classroom (vs. community)	0.25 (0.15)	
Delivery setting: pullout in school (vs. community)	0.20 (0.12)	
Program duration	-0.01 (0.00)	***
Session frequency	0.04 (0.02)	*
Implementation: Explicit problems	-0.38 (0.18)	*
Content element: Specific social skills	0.20 (0.12)	†
Model Statistics		
Q-model	20.05	**
Q-residual	287.92	***
τ^2 (between)	0.04	
τ^2 (within)	0.07	
I^2	49.98%	
R^2	0.00%	

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

The Q-model in Exhibit 8 indicates that the configurations of core components identified from the research account for significant between-study differences across the skill-building approaches. Comparing the between-studies τ^2 and total I^2 values from the model in Exhibit 8 to the corresponding values in the null model in Exhibit 1, we see that our core components substantially reduce the variability in the distribution. The model did not, however, leave a non-significant Q-residual, so there may be other factors that are not in our dataset that are associated with more or less effective programs. Nonetheless, practice guidelines developed from these findings have potential to result in positive changes in youth social competence.

5.4 Core Components for Academic-Educational Approaches

The characteristics of the final group of programs, academic-educational approaches, are shown in Exhibit 9. The programs in this group are comprised of tutoring and similar academic supports and differ from the other four groups in several ways. Academic-educational approaches average about 37 weeks in duration (approximately a full school year) and services are provided more frequently (often five days a week). Although focused on academics, programs are delivered in classroom settings, pull-out settings in schools, and in community settings (usually after school). Most programs in this approach group are focused on youth with academic difficulties rather than youth with behavior problems, though social competence is clearly a focus for these interventions as evidenced by the inclusion of social and interpersonal skills and conflict resolution among the content elements.

Exhibit 9. Characteristics of Academic-Educational Approaches (*k* = 15)

	Frequency (%) or Mean (sd)		Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality				**Content Elements**		
Explicit problems	4	(27%)	-0.22	Relaxation skills training	1	
Possible problem, no problems or no mention of problems	11	(73%)		Appropriate classroom behavior	3	
Delivery Complexity				Problem solving sequence	4	
Number of different settings	1.7	(0.72)	-0.40	Empathy	0	
Number of different delivery personnel	2.1	(0.92)	-0.24	Attribution retraining	1	
Number of different formats	2.3	(1.22)	-0.31	Moral development training	0	
Delivery complexity factor	0.3736	(0.80)	-0.23	Self-statements to inhibit impulsiveness or promote positive behavior	0	
Provider Training				Interpersonal, social skills	4	
Yes	8	(53%)	-0.03	Conflict resolution	2	
Provider Supervision				Assertive communication skills	0	
Yes	7	(47%)	0.01	Personal development	6	-0.05
Dosage				Identifying, understanding feelings	1	
Duration (weeks)	37.2	(23.48)	-0.15	Trusting relationship with caring adult	3	
Frequency (sessions/week)			-0.62	General personal or social support	2	
Less than weekly	0	(0%)		Behavioral coping skills for anger/aggression	0	
1x/week	1	(7%)		Problem solving sequence for anger/aggression	0	
More than 1x/week	14	(93%)		Attribution retraining for anger/aggression	0	
Delivery Setting				Self-statements to inhibit anger/aggression	0	
Classroom-based	5	(33%)	-0.16	Angry behavior cycle	0	
School-based pullout	4	(27%)	0.70	Parent skills training	2	
Community-based	6	(40%)	-0.30	Parent functioning	2	
Delivery Personnel				Social support, building support network	0	
Specialist staff	5	(33%)	0.08	Family communication skills	1	
Regular teachers	3	(20%)	-0.09	Engagement with child's school	3	
Researcher, students, laypersons, and others	7	(47%)		Information provision for families	1	
Delivery Format				Academic, educational	10	-0.26
One-on-one with provider	2	(13%)		School structure	0	
Multiple subjects, with provider	10	(67%)	-0.17	Service learning	1	
Mixed formats	3	(20%)		Self-sufficiency skills	0	

	Frequency (%) or Mean (sd)		Correlation with Effect Size
Lesson plans			
Yes	1	(7%)	0.23
Participant Characteristics			
Presenting Problem=behavior	2	(13%)	-0.15
Age	11.0	(4.37)	-0.30
Gender mix			-0.45
No males (<5%)	0	(0%)	
Some males (<50%)	3	(20%)	
50-60% male	2	(13%)	
Mostly males (>60%)	6	(40%)	
All males (>95%)	4	(27%)	
SES			-0.12
Low	12	(80%)	
Middle	2	(13%)	
Upper middle	1	(7%)	

	Frequency	Correlation with Effect Size
Health education and promotion	0	
Provide basic needs	0	
Recreational	3	
Employment, vocational	4	
Case management, service brokerage	4	
Parenting skills for youth	0	
Unspecified	0	
Violence and drug use education	0	

Note. k=number of studies. The correlations shown in the table are bivariate inverse variance weighted correlations between the potential core component and the effect size. For binary variables (e.g., implementation quality) the correlation is reported for only one direction. For categorical variables, the correlations reported are for the category shown with all other values on the variable in the reference category. The correlations are not reported for variables with small numbers of cases.

Exhibit 10 presents the results of the core components meta-regression analysis for the academic-educational approaches. **In contrast to the family relations and parenting skills and skill-based approach categories, longer programs were more effective than shorter programs. Explicit mention of implementation problems was also associated with smaller effects. In terms of content elements, academic-educational programs that included personal development components such as self-esteem building tended to be less effective than programs without such elements.**

Exhibit 10. Core Components for Academic-Educational Approaches (*k* = 15; *n* = 23)

Specific Core Components	b (se)	
Intercept	0.21 (0.17)	
Program duration (> than 30 weeks)	0.58 (0.24)	**
Implementation: Explicit problems	-0.58 (0.27)	**
Content element: Personal development	-0.27 (0.21)	
Model Statistics		
Q-model	8.16	*
Q-residual	56.53	***
τ^2 (between)	0.09	
τ^2 (within)	0.03	
I^2	69.98%	

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

The Q-model statistic for the academic-educational approaches is statistically significant. The Q-residual is also statistically significant. That and the large amount of between studies variance remaining (as evidenced by the τ^2-between and I^2 statistics) indicates that there may be other, unknown factors associated with positive program effects in addition to the program characteristics identified in our model. Although the models provide some clues to factors that are meaningfully associated with more effective programs (e.g., longer duration, implementation quality), the variability unaccounted for by the models could be predictable from characteristics that are unknown or unreported in the research. Nevertheless, the core components in the model have some potential to inform practice.

7 Conclusions

Overall, our analysis identified a range of actionable core components in the research on youth programs. Across the four approaches, a number of specific core components were identified, as summarized in Exhibit 11.

Exhibit 11. Summary of Analysis of Specific Core Components

	Program Content	Program Structure	Participant Characteristics	Implementation Quality
Family Relations and Parenting Skills	Programs that included one or more cognitive restructuring elements (e.g., cognitive problem solving sequence, attribution retraining, self-statements to promote self-regulation) or social, interpersonal skills elements exhibited larger program impacts.	One-on-one formatted programs exhibited larger program impacts. Longer duration programs (>10 weeks) with frequent service delivery (>1/week) evidenced larger program impacts.		Explicit mention of implementation problems was associated with smaller program impacts.
Relational		Programs with more complex delivery structures exhibited smaller program impacts. One-on-one formatted and school-based programs exhibited larger program impacts.	Programs with younger children exhibited larger program impacts.	Explicit mention of implementation problems was associated with smaller program impacts.
Skill-Building	Programs that included one or more social skills elements (interpersonal or social skills, conflict resolution, assertive communication skills, identifying and understanding feelings) exhibited larger program impacts.	School-based programs (both in class and with pull-out formats) were more effective than community-based programs. Longer programs were less effective, but more frequent programs showed larger impacts, regardless of duration.		Explicit mention of implementation problems was associated with smaller program impacts.
Academic-Educational Approaches	Programs that included personal development elements exhibited smaller program impacts.	Longer duration programs showed larger impacts.		Explicit mention of implementation problems was associated with smaller program impacts.

There are some consistencies across the program approaches in the key core components that were revealed in the analysis. Most notable is the consistent relationship of implementation problems to smaller program impacts. In addition, one-on-one formatted programs tended to have larger impacts than those which used group delivery. The relationships we see between program duration, program frequency, and program impacts indicate that, for many programs, lengthier or more intensive services produce greater improvements in social competence.

The profiles of core components for family relations and parenting skills, skill-building, and academic-educational approaches explain meaningful differences in program impacts and, thus, have the strongest potential to inform practice

guidelines. However, the small number of studies available for the academic-educational approaches means that the corresponding practice guidelines may have somewhat less potential influence on youth outcomes because more research may uncover other, more influential core components. In contrast, the model for relational approaches, though it points to particular factors associated with more effective programs, did not account for significant variability in program effects. There may be other factors associated with larger or smaller impacts that could potentially overshadow the factors identified in our models. The weak model fit that we observe for relational approaches means that we are less confident about the practices we might recommend that could improve outcomes for service providers implementing such approaches. For these approaches, more work is needed to have a stronger claim on the core components that might be influential enough to improve youth outcomes.

The findings reported here and the meta-regression analyses we use to produce them are correlational and it would be incorrect to draw causal conclusions from this work. What should be drawn from the effort is evidence-based, practical guidelines that can be used to inform practice. We also note that there is a limited range of and, especially, detail about potential core components available from the contributing studies. We extracted from the studies and explored in our analyses a number of variables, but large proportions of the differences in effectiveness we see between studies is left unexplained. Future studies and, we hope, better reporting of key program and implementation features may further improve our ability to identify more features associated with positive effects. Indeed, the ultimate test of the validity of results such as these is not the statistical relationships we observe among the source studies, but demonstrations in the field that programs with the identified core components do in fact have better outcomes.

The next step for this work involves more fully developing each of the core components we identified here into actionable practice guidelines. This will include delving into the research studies themselves, as well as the literature on implementation strategies, to identify practical examples and tips for how to put something in to practice.

Appendix A. The Meta-analytic Database

This paper makes use of a large meta-analytic database developed by Sandra Wilson of Abt Associates and her colleague, Mark Lipsey of Vanderbilt University, which houses the results of hundreds of studies of youth programs. This database is a compilation of seven separate meta-analyses of youth programs conducted by two teams (Lipsey/Wilson and Joseph Durlak). This appendix provides details about the meta-analytic database and its development.

The research captured in the database represents a range of program environments and age ranges and includes only randomized control trials or quasi-experiments of relatively high quality. Each study provides estimates of program impacts (i.e., effect sizes) for the major study outcomes, along with descriptive details about each study's program, providers, participants, and implementation activities. Many of the studies in the database provide information about the programs, providers, and implementation activities that serve as our potential core components. Some studies provide extensive detail, while for others reporting is somewhat limited. To maximize the utility of our approach, it would be desirable to have more information reported about the features that serve as our potential core components than we typically find in the research. But, within the limits of what is reported, the common coding scheme we developed to collate the seven meta-analyses attempts to capture as much detail as possible about the wide range of topics that might inform our work. Exhibit A1 describes the range of programs and outcomes included in the database and the year of publication for the most recent studies in each. For the analyses reported in this report, we selected studies from any of the seven meta-analyses involving selected or indicated prevention programs that reported program impacts on social competence.

Exhibit A1. The Seven Meta-analyses Included in the Database

Meta-analysis	Studies Included	Primary Outcomes	Most Recent Studies
After-school programs (Durlak, Weissberg, & Pachan, 2010)	68 studies of after-school programs for youth age 5-18	Social-emotional skills, self-esteem, conduct problems/externalizing, academic performance, school attendance and engagement, and substance use	2007
School-based social and emotional learning programs (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011)	213 studies of universal school-based programs for youth age 5-18 targeting social-emotional learning	Social-emotional skills, positive social behavior, conduct problems/externalizing, internalizing problems, academic performance, self-esteem, and school attitudes	2007
School-based prevention programs for acting out problems (Payton, et al., 2008)	38 studies of school-based prevention programs for acting out problems for at-risk children in grades K-6	Positive social behavior and conduct problems/externalizing	2007
Parent and family programs for improving child mental health outcomes (Durlak, 2007)	57 studies of programs intervening with parents or family to influence outcomes for school-aged children (age 5-18)	Positive social behavior, family relations, conduct problems/externalizing, and emotional distress/internalizing problems	2007
Interventions for juvenile offenders (Lipsey, 1992; Lipsey, 2009)	583 studies of interventions for juvenile offenders age 12-21	All the studies have delinquency outcomes; other outcomes include social-emotional skills, self-esteem, peer and family relations, emotional distress/internalizing problems, school attendance, school dropout, school performance, and conduct problems	2007
Early interventions targeting risk for antisocial behavior (Wilson, Lipsey, & Derzon, 2003; Wilson & Lipsey, 2007)	456 studies of interventions for youth under age 18 focused on antisocial behavior and risk for antisocial behavior	All the studies have conduct problem outcomes; other outcomes include social-emotional skills, peer relations, self-esteem, self-control, internalizing, and academic performance	2004
School dropout prevention programs (Wilson, Tanner-Smith, Lipsey, Steinka-Fry, & Morrison, 2011)	317 studies of school dropout prevention programs	All have school dropout or graduation outcomes; other outcomes include attendance, academic performance, school attachment, and conduct problems/externalizing	2009

Coded Variables in the Meta-analytic Database

The two research teams (Lipsey/Wilson and Durlak) that created the seven meta-analytic databases collaborated and built from each other's work over time. Thus, the databases had many similar coding items to begin with, but they were not identical. To create the combined database, Wilson and Lipsey built on and adapted the original coding to produce a uniform set of coded items across the combined database. The database includes many variables, not all of which were used in the analysis. This section shows the coding items as they are coded in the database for all of the variables used in the analyses reported in this paper in the program structure, implementation strategies and outcomes, and participant characteristics domains. We also show the coding items for the methodological characteristics. The items in the program content domain are included in the next section. In many cases, variables were combined or recoded for analysis.

Program Structure

Duration of treatment. Approximate (or exact) number of weeks that subjects received treatment, from first treatment event to last excluding follow-ups designated as such. Divide days by 7; multiply months by 4.3. Code 999 if cannot tell. Estimate for this item if necessary, and if you can come up with a reasonable order of magnitude number.

Approximate (or exact) frequency of contact between participants and provider or program activity. This refers *only* to the elements of treatment that are different from what the comparison group receives.

1. Less than weekly
2. Once a week
3. 1-2 times a week
4. 2 times a week
5. 2-3 times a week
6. 3 times a week
7. 3-4 times a week
8. 4 times a week
9. Daily contact (not 24 hours of contact per day but some treatment during each day, perhaps excluding weekends, e.g., as in a school-based program that occurs every school day)
10. Continuous (e.g. residential living)

99. Cannot tell

Primary location of the program. Where does the service delivery take place?

1. School
2. Not school
3. Institution (i.e., residential)
4. Alternative school (must be clearly specified as "alternative" school)

Specific Site Detail. Where was the intervention delivered? Think about the actual treatment events and where they occurred. Check all that apply.

<u>School Sites</u>

1. Regular Classroom (interventions delivered during regularly scheduled classes AND in the children's regular classroom)
2. Special Class (e.g., children in treatment are in a classroom-type setting that is different from a typical classroom, although it may be the subjects' usual classroom – includes such settings as special education classrooms, alternative schools, etc.)
3. Entire School; Systemic (this would include interventions like metal detectors and other environmental changes that presumably affect the whole school)
4. Resource Room, School Counselor's Office, or other similar setting that is NOT the children's regular classroom; the idea here is that children are removed from class for treatment
5. School Playground
6. School Site, cannot tell which of the above

7. After School: treatment delivered at school facility, but not during regular school hours

Non-school Sites

8. Outpatient, Non-residential, Private office, clinic, center (e.g., YMCA, university, therapist's office; medical facility)
9. Outpatient, Non-residential, Public office, clinic, center (e.g., probation department, public mental health clinic, community or neighborhood center)
10. Home (Treatment delivered in the subject's home)
11. Religious institution (not parochial school)
12. Park, playground, wilderness area, etc.
13. Work site (e.g., community service, trash collection on roadside, etc.)
14. Universal (e.g., media intervention)

Institutional, Residential

15. Institution, residential (hospital, mental health facility, non-juvenile justice)
16. Public institution, residential (juvenile justice auspices)

17. Other

Focal Intervention Site. From the list above, select the focal intervention site. When there is more than one intervention site, the focal site is the site where the bulk of the intervention was delivered (i.e., where the participants spent the most time receiving direct services). If you cannot tell which of multiple sites is focal, flag the study for discussion so that decision rules can be made moving forward.

Who delivered the intervention? The items in this section refer to the delivery personnel regardless of whether they work at the host organization, the instigating organization, or elsewhere, i.e., the individuals who have direct contact with the children served by the program (or parents for parent training interventions). From the following list, check all that apply and, in the last item in the sequence, identify the primary or "focal" service provider.

People who work for the researcher/evaluator:

1. Researcher/author only
2. Graduate or undergraduate students
3. Laypersons
4. Specially trained teachers (teachers who are trained specifically to deliver the intervention AND who are not the students' regular teacher)
5. Other: _____

People who don't work for researcher:

6. Regular teachers
7. School staff
8. Laypersons, volunteers
9. Psychiatrist, psychologist
10. Social worker, caseworker, school counselor, vocational counselor
11. Police or probation officer
12. Parents
13. Peers
14. Self-directed
15. Other: _____

Who delivered the intervention? From the list above, select the focal provider. For interventions with more than one service provider, the focal provider is the individual who had the most contact with the participating youth (or parents for parent-oriented programs). If you cannot tell which of multiple delivery personnel types is focal or the multiple types of personnel appear equal, flag the study for discussion so that decision rules can be made moving forward.

Delivery Timing. When was the intervention delivered?

1. During regular school hours (does not have to be a school setting)
2. After school
3. Evenings and/or weekends
4. Institutional or residential program
5. Other
9. No information provided

Primary format of treatment sessions. The primary emphasis of this question is on who was present with the treated individuals during treatment sessions. *Check all that apply.*

1. Subject alone (self-administered treatment, e.g., bibliotherapy; nobody else is present but the subject)
2. Subject and provider, one on one
3. Group of subjects with provider, not a classroom setting (e.g., group therapy session)
4. Student group, classroom setting
5. Parents only with provider, child not present
6. Group of parents with provider, children not present
7. Parents alone (self-directed)
8. Child and parent(s) together with provider
9. Group of families (parents and children) with provider
10. Child and parent(s), no provider
11. Treatment professionals, teachers, school staff only; children not present
12. Service (e.g., peer mediation, volunteering)
13. Systemic program; no format (e.g., media interventions, school-wide reforms that don't involve direct services to any students or influential others)

Primary format of treatment sessions. Select one focal format from the list above. If the intervention involves multiple formats, select as focal the one that involved the most amount of time. If there are multiple formats with equal time or you cannot determine the focal format, flag the study for discussion.

Implementation Strategies and Problems

Did the provider or treatment personnel receive special training in this specific program, intervention, or therapy prior to the beginning of the intervention?

1. Yes
2. No
9. No information provided

Is there evidence of ongoing supervision, consultation, coaching, booster sessions, debriefing, or other forms of support during the intervention for the treatment providers delivering the intervention? This would include provision of feedback to providers based on observations by the research team.

1. Yes
2. No
9. No information provided

Based on specific data or author discussion, was there a drop or reduction in the desired level of implementation that was achieved? Did the authors discuss any problems in implementation that might have been caused by such things as high dropouts, erratic attendance, treatment not delivered as intended, staff turnover or burnout, staff caseloads, administrative issues, wide differences between settings or individual providers, etc.?

1. Yes, implementation problems were evident (describe below)
2. Possible problems (describe below)
3. No, implemented as intended (must have a clear statement)
4. Level of implementation not reported

Participant Characteristics

Presenting problem. Identify the primary presenting problem of the participants upon entering the program.

1. None. General population sample, no indication that participants entered the program because of a specific issue or problem.

Problems or negative behaviors in participating child/youth

2. Externalizing problems: violence/aggression
3. Delinquency, police contact
4. Externalizing problems: noncompliance/behavior problem
5. Externalizing problems: bullying
6. Externalizing problems: anger management
25. Externalizing problems: ADD, ADHD, Attention problems or similar
7. Externalizing problem: combination of above (or cannot tell specifics)
8. Internalizing problems: depression or anxiety
9. Internalizing problems, other (e.g., fears, somatic problems)
10. Internalizing: combination (or cannot tell specifics)
11. Externalizing and internalizing difficulties combined

Family relationships

12. Parental attachment/bonding or parenting practices
13. General family relationships, family functioning
14. Other family

Peer relationships

15. Friendships, interactions
16. Peer rejection or dislike (or isolation, neglect)

Academic performance

17. Academic achievement
18. Study skills (including attending behavior)
19. Behavioral school adjustment (attendance, tardiness)
20. Other academic

Other

21. Physical health
22. Drug use/misuse
23. Other: _____
24. Multiple problems spanning above categories: _____

Gender mix of youth in this group.

1. no males (<5%)
2. some males (<50%)
3. 50% to 60% male or estimated 50%-50% split for intact groups such as classrooms or schools where you might expect the gender distribution to be approximately equal
4. mostly males (>60%)
5. all males (>95%)
9. cannot tell

Predominant ethnicity (60% or more) of the subjects in this group.

1. Anglo
2. Black
3. Hispanic
4. Other Minority
5. Mixed, none more than 60% or cannot estimate percent
9. Cannot Tell

Socioeconomic status: _____

Describe any details provided in the study report about the participants' socioeconomic status. This might include statements about a "white middle class community" and the like, or may involve explicit scoring of parents' occupations. You should copy or closely paraphrase the information directly from the study reports.

Participant age. Record any age-related information provided about the sample.

Enter the average age of the sample using number of years.
Enter the average grade level of the sample.

Enter the lowest age using number of years.
Enter the highest age using number of years.
AND
Enter the lowest grade level.
Enter the highest grade level.

Grade level.
1. Elementary
2. Middle
3. High School
4. Mixed grade levels
9. Cannot tell

Methodological Characteristics

Unit of group assignment. The unit on which assignment to groups was based.

1. Individual (i.e., some children assigned to treatment group, some to comparison group)
2. Group (i.e., whole classrooms, schools, therapy groups, sites, residential facilities assigned to treatment and comparison groups)
3. Program area, regions, school districts, counties, etc. (i.e., region assigned as an intact unit)
9. No information provided

Method of group assignment. How participants/units were assigned to groups. This item focuses on the initial method of assignment to groups, regardless of subsequent degradations due to attrition, refusal, etc. prior to treatment onset. These latter problems are coded elsewhere.

Random or near-random:

1. Randomly after matching, yoking, stratification, blocking, etc. The entire sample is matched or blocked first, then assigned to treatment and comparison groups within pairs or blocks. This does not refer to blocking after treatment for the data analysis.
2. Randomly without matching, etc. This also includes cases when every other person goes to the control group.
3. Regression discontinuity design: quantitative cutting point defines groups on some continuum (this is rare).
4. Wait list control or other quasi-random procedure presumed to produce comparable groups (no obvious differences). This applies to groups which have individuals apparently randomly assigned by some naturally occurring process, e.g. first person to walk in the door. The key here is that the procedure used to select groups doesn't involve individual characteristics of persons so that the groups generated should be essentially equivalent.

Non-random, but matched: Matching refers to the process by which comparison groups are generated by identifying individuals or groups that are comparable to the treatment group using various characteristics of the treatment group. Matching can be done individually, e.g., by selecting a control subject for each intervention subject who is the same age, gender, and so forth, or on a group basis, e.g., by selecting comparison schools that have the same demographic makeup and academic profile of treatment schools.

5. Matched ONLY on pretest measures of some or all variables used later as outcome measures.
6. Matched on pretest measures AND other personal characteristics, such as demographics.
7. Matched ONLY on demographics: big sociological variables like age, sex, ethnicity, SES.

Nonrandom, no matching prior to treatment but descriptive data, etc. regarding the nature of the group differences:

8. Non-random, not matched, but pretreatment equivalence information is available.
9. No information provided

Control or Comparison Condition. What do subjects in the control or comparison group receive?

1. "Straw man" alternate program or treatment, diluted version, less extensive program, etc., not expected to be effective but used as contrast for treatment group of primary interest. If the alternate treatment is not minimal and could realistically be expected to be effective, it is not a control condition and should be classified as a focal treatment instead.

2. Placebo (or attention) treatment. Group gets some attention or sham treatment (e.g., watching Wild Kingdom videos while treatment group gets therapy).

3. Treatment as usual. Group gets "usual" handling instead of some special treatment.

4. No treatment. Group gets no treatment at all.

Context of comparison group. Are comparison group participants in the same institutional context as the intervention participants? For example, if treatment kids are pulled out of class, are control kids also pulled out for, e.g., an attention placebo condition, or do they remain in their usual classrooms? If intervention subjects are institutionalized, are the comparison subjects in the same or similar institution?

1. Yes
2. No
9. No information provided

Program Content Elements

The following section shows the full coding scheme for content elements. Elements were coded as present/absent for each program and are not mutually exclusive. An intervention element is defined as a discrete, reliably identifiable technique or strategy, which (a) is used as part of a larger intervention or prevention program, (b) is intended to influence the behavior or well-being of a service recipient, and (c) cannot be further subdivided without being rendered inert. Both content and process elements were recorded for each intervention.

Behavioral
Relaxation skills training. For example, meditation, breathing exercises, imaging peaceful scenes.
Appropriate classroom behavior. For example, learning when it is appropriate to raise your hand, take turns speaking, paying attention to instructors, how to contribute to an orderly classroom environment (i.e., not creating distractions).
Cognitive/cognitive restructuring
Problem-solving sequence**:** identify problem, think of alternatives, consequences, monitor outcomes. Not anger related.
Empathy. Activities focused on perspective taking and empathy. Children are taught to think about how other people would feel in a given situation.
Attribution retraining/Cognitive coping skills for stress. For example, children experiencing divorce (understanding that the divorce is not their fault). Attribution re-training for internal attributions of success and failure, understanding that there are both healthy and unhealthy attributions. Note: Rational Emotive Therapy/Rational Emotive education would be coded here, characterized by a model for changing irrational beliefs into rational ones (i.e., changing the way someone responds to stress or an unpleasant event by changing their thoughts about that event).
Moral development training/moral dilemmas
Self-statements to inhibit impulsive behaviors or promote positive behaviors (not anger related) self-instruction and self-talk can all be coded here.
Interpersonal/social skills/personal development
Interpersonal social skills**:** friendship, peer group interaction skills, affiliation with prosocial peers, prosocial skills, family relationships, general communication and active listening skills.
Conflict resolution, social or collaborative problem-solving skills (how to solve problem together with peers) Note: "Social problem-solving" is often used to describe a cognitive problem solving process. If so, code under cognitive rather than interpersonal.
Assertive communication skills, how to resist peer pressure*.* Includes assertiveness without aggression
Personal/individual development**:** self-concept, self-confidence, values clarification/"life creed," goal-setting/future orientation, decision-making skills. Including investment and engagement in school.
Identifying, understanding, and communicating feelings and emotions. However, identifying feelings and emotions as the first step of cognitive problem solving sequence should be coded as cognitive-problem solving sequence. This can include drawing attention to feelings, but attribution –retraining program should not be coded here.
Trusting relationship with a caring adult. Often found with mentoring programs and youth development programs.
General personal or social support. e.g., peer support groups or discussion groups where no specific skills are taught, or individual counseling (by licensed professional) where no specific skills are taught.
Anger management
Behavioral coping skills for anger/aggression**:** includes behavioral impulse control (overt motor responses e.g., placing fist over mouth, hands tucked under arms) and distraction techniques (e.g., push-ups, timeouts, walking around)
Problem-solving sequence for managing anger/aggression (identify problem, think of alternatives, consequences, monitor outcomes)
Attribution training or retraining**:** learning to recognize accidental causes in interactions with peers to minimize aggressive responses.
Self-statements to inhibit anger or aggressive behavior, self-instruction and self-talk can all be coded here.
Angry behavior cycle/provocation cycle. Identify cues/triggers for angry behavior- your own or others. Emphasis on understanding triggers and possibly physical response. If there is focus on alternative responses, you may also consider coding as behavioral coping skills for anger/aggression.

Content for caregivers and families
Parenting skills *(e.g., positive discipline skills, communicating with child)*
Parent functioning and well-being *(e.g., coping with stress, self-care)*
Social support; skills for building support network
Family communication skills, family problem-solving skills, family interactions.
Engagement/communication with child's school
Information provision for families. Education on child development, health information (sex education, ADHD) etc.

Other content categories
Academic/educational. Includes the following types of programs (provided for reference, but are not sub-elements to code). Tutoring; homework assistance; test-taking skills; study skills • Academic monitoring. Includes attendance, homework, performance monitoring. • Field trips in educational context. • Remedial education • GED preparation • College focused (e.g., academic advising, summer/weekend programs, application assistance)
School structure. Class or grade reorganization, small class size, alternative school, school-level policies. This content element may not have an associated process element.
Service learning. Engaging in community service projects or volunteer roles to benefit community or school. This content element may not have an associated process element.
Self-sufficiency skills. Daily living and personal management (distinct from social skills).
Health education and promotion. Personal hygiene, nutrition, STIs, etc.
Provide basic needs. Medical and dental exams, screenings, etc.
Recreational. Sports/athletics, games, field trips (other than educational), adventure-based activities, summer camps, arts & crafts, music, general recreation, etc. This can be coded with process unspecified if little information is provided. If it's used as a strategy for keeping participants engaged, can code process element as other engagement strategies.
Employment/vocational/job readiness. Supervised work programs, job placement, career counseling, job or vocational training.
Case management or service brokerage. Includes assessment of need and referral provided by an agency, individualized treatment plans, and case management services when all participants are receiving different customized services. This content element may not have an associated process element.
Parenting skills for youth. Parenting skills that are taught to youth (could be teen parents or youth that are not currently parenting).
Content unspecified. Use for process elements with no clear content (for data management purposes).
Violence and Drug Use Education. Drug and substance use education, education on gang involvement and consequences of violent and criminal behavior. Includes field trips to prisons and ride-alongs with police members.

Process Elements

For each content element, we also recorded any process elements, which are the active techniques or mechanisms through which a service provider delivers content elements and supports the behavior change process. The process elements were not used in the analysis, but may be used in the practice guidelines to provide additional guidance on how to implement a practice.

Access/Retention/Engagement Strategies: Any strategy designed to support or encourage participation in, or with, a practitioner, program or service.
Engagement-Behavioral strategies targeting engagement or retention. For example, rewards for adhering to group rules or attending sessions. Includes both positive and negative reinforcements.
Removing barriers to participation, e.g., providing childcare, transportation support, meals during sessions.
Reminders to attend meetings or sessions
Other engagement strategies to engage or motivate participants (non-behavioral).
Instructional or Pedagogical Strategies: Instructional or pedagogical techniques are process elements through which information is imparted and skills are built. The recipients of the information may be passive or active participants in the instructional activities.
Lecture, seminar, instruction (live or not live). Instruction can be delivered to individuals, may be academic tutoring or the material delivered is the same for all participants. This is distinct from an individualized therapeutic approach.
Group discussion/interaction – peer, family, or other
Modeling (live)
Modeling (or video)
Role play, behavioral rehearsal and feedback, trying new skills
Experiential learning. Development of knowledge, skills, or values from direct experiences or "hands on" learning (e.g. apprenticeship/internships)
Self-evaluation/reflection/self-monitoring. The process of reflecting on content learned on one's own, may include journaling, logs, and diaries. If reflection occurs during group discussion, code as group discussion. This should not be used when there is self-monitoring as part of the problem sequence, self-statements, role play, or modeling.
Self-directed learning. Content is delivered via a self-directed format (e.g. a workbook sent home, online/computer sessions where the content is taught through the software, not by a person). Self-directed activities to reinforce content learned previously should be code as homework.
Behavioral Strategies
Behavior modification – positive reinforcement. Techniques that *reward* (e.g., token economy, stickers, small toys) *for desirable behaviors* targeted by the intervention. Note: some token economies might combine positive reinforcement w/ negative punishment).
Behavior modification – negative or positive punishment. Techniques that *discourage undesirable behavior by taking away something valued* or *adding a negative consequence.* (e.g., time out, grounding, detention, adding more rules & restrictions, extra chores or homework, reprimanding)
Counseling Strategies. These should be therapeutic relationships (with licensed/trained professional not layperson or peer)
Reality therapy. Specific type of therapy that emphasizes changing behavior rather than feelings; and focuses on the present and future, while avoiding discussing past events.
Individual counseling, e.g., cognitive behavioral therapy, psychotherapy (other than reality therapy) for youth or parents).
Motivational interviewing. A goal-oriented, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence.
Group counseling, group therapy for peer groups, parent groups, and groups of families (multi-family).
Family counseling (individual families)
Mediation. Counselor mediates/arbitrates between parties in conflict.
Support groups for youth or parents/caregivers (can be facilitated by layperson)
Mentor provided for youth (adult layperson)

Peer-Driven Strategies
Peer mediation - recipient of services
Peer mediation - serving as mediator
Peer mentoring/counseling - recipient of services. Format can be with individuals or group. Includes peer facilitators.
Peer mentoring/counseling - serving as mentor/counselor to an individual or group. Includes peer facilitators.
Peer tutoring/education – serving as tutor or educator of academic and other content.
Positive Peer Culture (specific approach where youth assume responsibility for helping one another and hold each other accountable)
Peer tutoring/education – recipient of peer educator of academic and other content
Supporting Change: Refers to elements that support child or parental behavior change.
Homework. Tasks given to client(s) to complete outside of session(s) to improve treatment adherence or reinforce/facilitate new knowledge or skills that are consistent with the intervention.
Referrals to other services
Program Integration. Efforts by the program to reinforce content in other spheres of the child's life with the goal of this continuing on after the intervention. E.g., communication, conferences, or trainings with a parent/school staff to integrate content from the intervention in home or school life.
Process Unspecified. Use for process elements with no clear content (for data management purposes).

Exhibit A2. Selected Characteristics of the Studies Included in the Analysis (*k* = 144)

	Mean (sd) or Frequency (%)			Frequency
Program Dosage			**Content Elements**	
Duration (weeks)	19.5	(20.57)	Relaxation skills training	7
Frequency (sessions per week)			Appropriate classroom behavior	20
Less than weekly	4	(3%)	Problem solving sequence	47
1x/week	67	(47%)	Empathy	12
More than 1x/week	73	(51%)	Attribution retraining	20
Program Complexity			Moral development training	0
Number of Different Formats	1.6	(1.06)	Self-statements to inhibit impulsiveness or promote positive behavior	6
Number of Different Provider Types	1.8	(1.04)	Interpersonal, social skills	72
Number of Different Settings	1.4	(0.79)	Conflict resolution	8
Delivery Setting			Assertive communication skills	18
Classroom-based	29	(20%)	Personal development	57
School-based pullout	61	(42%)	Identifying, understanding feelings	28
Community-based	54	(38%)	Trusting relationship with caring adult	10
Delivery Personnel			General personal or social support	11
Researcher	42	(29%)	Behavioral coping skills for anger/aggression	5
Specialist staff	40	(28%)	Problem solving sequence for anger/aggression	19
Teachers	17	(12%)	Attribution retraining for anger/aggression	1
Laypersons, paraprofessionals	11	(8%)	Self-statements to inhibit anger/aggression	9
All others	34	(24%)	Angry behavior cycle	11
Implementation Problems			Parent skills training	36
Explicit problems	24	(17%)	Parent functioning	7
Possible problem, no problems or no mention of problems	120	(83%)	Social support, building support network	8
Provider Training or Supervision			Family communication skills	25
Training	90	(63%)	Engagement with child's school	11
Supervision	72	(50%)	Information provision for families	8
			Academic, educational	25
			School structure	0
			Service learning	4
			Self-sufficiency skills	0
			Health education and promotion	0
			Provide basic needs	3
			Recreational	11
			Employment, vocational	6
			Case management, service brokerage	8
			Parenting skills for youth	0
			Unspecified	0
			Violence and drug use education	3

Appendix B. Analytic Methods

This report focuses on the social competence outcomes from the larger meta-analytic database described above. These outcomes were recorded from the research studies as standardized mean difference effect size statistics (*d*) calculated as the post-intervention differences in social competence measures between the intervention and control groups, divided by the pooled standard deviation of the groups. Although the larger database contains effect sizes that were derived from binary outcome data, all effect sizes in this report were computed directly from means and standard deviations (or equivalent statistics) as standardized mean differences. Further, all effect sizes were multiplied by the small sample correction factor (Hedges, 1981), 1 – (3/4n-9), where n is the total sample size for the study, and each was weighted by its inverse variance in all computations. The inverse variance weights were computed using the subject-level sample size for each effect size. Because many of the studies used groups (e.g., classrooms, schools) as the unit of assignment to intervention and control conditions, they involved a design effect associated with the clustering of students within classrooms or schools that reduces the effective sample size. We calculated the total cluster-adjusted sample size using an intra-cluster correlation coefficient (ρ) of 0.1 (Borenstein et al., 2009).

Examination of the effect size distribution identified a small number of outliers with potential to distort the analysis; these were Winsorized to less extreme values using Tukey's inner fences. In addition, several studies had unusually large samples. Because the inverse variance weights chiefly reflect sample size, those few studies would dominate any analysis in which they were included. Therefore, the extreme tail of the sample size distribution was Winsorized using the Tukey fences for skewed distributions.

Many studies provided data sufficient for calculating mean difference effect sizes on the outcome variables at the pretest. In such cases, we adjusted the posttest effect sizes by subtracting the pretest effect size value. Indicator variables were tested in the methods analysis shown below to determine if there were systematic differences between effect sizes that were adjusted in this way and those that were not.

Handling Dependent Effect Sizes

Studies often reported multiple effect sizes in the social competence outcome domain. These multiples came in several forms. In some cases, studies reported effect sizes for more than one competency (communication skills, cooperation). In other cases, studies reported the same type of outcome but from different informants (e.g., parents, teachers). The multiple effect sizes were similar enough within study that we elected to retain the multiples in the analyses for this report. To account for the statistical dependencies that result from having multiple effect sizes from the same study sample, we used multi-level meta-regression models for all analyses (Konstantopoulos, 2011; Viechtbauer, 2010). Indicators for the different type of social competence outcomes and informant were tested in the methods analyses reported below.

Missing Data

Some studies were missing data on the method, participant, or program variables used in our analysis. Most variables had fewer than 10% of cases missing. To permit us to use the full sample of studies in our analysis, we imputed missing values for moderators with the 'mice' package (van Buuren & Groothuis-Oudshoorn, 2011) in R (3.5.1). We produced 20 imputations with this method. All analyses reported in this paper were run on the 20 imputed datasets and aggregated. Degrees of freedom and standard errors were adjusted to account for the uncertainty introduced by the imputation process per Barnard and Rubin (1999).

Selection and Recoding of Moderators

For analysis, most moderators were recoded into dummy codes or categorical variables with fewer categories than the coded version. The descriptive statistics for variables used in the analysis are presented as appropriate. We selected moderators based on the magnitude of their bivariate correlations with effect size. When multiple moderators that were conceptually similar were available, we either created composite variables or selected the moderator that had the strongest relationship with effect size.

The meta-analytic database includes a large number of potential core components, many more than we could explore in a single analysis. To select moderators for analysis, we used a combination of strategies. First, we examined the bivariate correlations of each moderator with the effect sizes as well as the intercorrelations among the moderators. For those variables with correlations larger than r=.10 that had sufficient variability (i.e., moderators for which only a few studies had the feature were not explored), we performed a form of random forest analysis designed for meta-analytic data (Hapfelmeier & Ulm, 2013; van Lissa, 2018). Random forest analysis is a method for selecting moderators for regression analysis using machine learning techniques; this technique explores the strength of the relationships of each potential moderator with the effect sizes while taking into consideration the relationships of each moderator with the others. One result of a random forest analysis is a variable importance plot that identifies the moderators' association with the effect sizes while taking into account the intercorrelations. Potential core components that were identified as important in the random forest analysis were entered into meta-regression models.

Rather than relying on statistical significance, which we felt would cause us to overlook substantively meaningful relationships, moderators were retained in the final meta-regression models based on a threshold of .10 effect size units. Binary core components were considered to have a meaningful relationship with effect sizes if their independent contribution to predicting effect sizes (the regression coefficients, or *b*s, in the models) was 0.10 or larger. We also used the .10 threshold for core components indexed on a standard scale (i.e., with a mean of zero and a standard deviation of 1) such as delivery complexity. The .10 threshold was also considered meaningful when associated with a 1 point change on core components that were ordinal (e.g., gender mix and SES). One potential core components was scaled continuously, average age of the sample. For this variable, if a 3 year change on age was associated with +/- .10 in the effect size, the variable was considered meaningful. This value represents approximately half of a standard deviation. Program duration and frequency, though coded as continuous and ordinal, respectively, were converted to binary variables for most analyses.

Delivery Complexity Factor Analysis

The delivery complexity variable that appears in the universal core components models is a principal components factor computed from three variables: counts of different implementation settings (e.g., classroom, home, playground), different types of delivery personnel (e.g., teachers, laypeople, program specialists), and different program formats (e.g., group, one-on-one). Principal components analysis was used because we were interested in computing composite scores for the meta-regression analysis. A single factor was produced.

Data Analyses

All analyses were conducted in R (R Core Team, 2019). Analyses were inverse variance weighted using random effects statistical models that incorporate both within-study and between-study sampling variance estimates into the study level weights. The between studies variance components (τ^2) was estimated using restricted maximum likelihood. Random effects weighted mean effect sizes were calculated for all studies using 95% confidence intervals. Estimates of Cochrane's Q, I^2, and τ^2 were used to assess heterogeneity in the effect sizes. The regression analyses reported in this paper were performed using the 'metafor' package in R (Viechtbauer, 2010).

Appendix C. Analysis of the Influence of Method Variables

The meta-analytic database includes a wide range of variables relating to study methods and research procedures, some of which are associated with effect sizes. These variables cannot serve as potential core components but must be addressed in the analysis to ensure that the substantive relationships we explored earlier are not overly attenuated or obscured by the influence of the method variables. Descriptive statistics for the major method variables in the dataset are presented in Exhibit C1.

Exhibit C1. Study Methods and Research Procedures for All Studies (*k* = 136; *n* = 278)

	Frequency (%)	Mean (sd)	Range	Correlation with Effect Size
Study-Level Attributes (k=136)				
Research Design				
Individual and cluster random assignment	95 (70%)			-0.15
Quasi-experimental design	41 (30%)			
Comparison Group Level of Service				
Level of service (higher scores=less service)		2.9 (0.78)	1-4	-0.02
Treatment and Control Group in the Same Context				
Yes	45 (33%)			0.003
Effect-Size-Level Attributes (n=278)				
Features of Average Effect				
Total sample size (Winsorized)		60 (63)	14-326	-0.30
Effect sizes adjusted for pretest	202 (73%)			0.01
Type of Behavior Measured				
Interpersonal, social skills	194 (70%)			
Social adjustment	84 (30%)			-0.13
Informant for the Outcome Measures				
Subjects	83 (30%)			-0.15
Parents	37 (13%)			0.02
Teachers	101 (36%)			-0.02
Peers/Therapist/Service Provider/Observation/others	57 (21%)			0.22

To explore the influence of methodological features of the studies, we estimated one model that included methods variables for the full sample of 136 programs (278 effect sizes) used in the analyses of the four program approaches. These results are shown in Exhibit C2. The Q-model statistic is significant, indicating that method variables do reliably account for some of the variability we observe both within and between studies. In particular, sample size and informant were the most influential variables in the model. Smaller samples generally exhibited larger impacts. And, self-reports by youth, parent reports, and teacher reports all tended to have smaller effect sizes than the reference category, which includes peer and service provider reports and observations.

Exhibit C2. Method Variables Analysis for All Programs (*k* = 136, *n* = 278)

	Model 1		
Method Variables	**b**	**se**	
Intercept	0.82	(0.18)	***
Design: Individual and cluster random assignment	-0.10	(0.08)	
Comparison group level of service (higher scores=less service)	0.02	(0.05)	
Intervention and comparison group same context	-0.05	(0.08)	
Type of behavior: social adjustment	-0.04	(0.06)	
Total sample size (winsorized)	-0.002	(0.00)	***
Effect size adjusted for pretest	-0.14	(0.07)	*
Informant for outcome measure			
Subjects (self-reported)	-0.30	(0.09)	***
Parents	-0.14	(0.10)	
Teachers	-0.31	(0.08)	***
Model Statistics			
Q-model	36.586	**	
Q-residual	583.758	***	
τ^2 between	0.077		
τ^2 within	0.021		
I^2	57.1%		

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

How Method Variables Affect the Substantive Analyses

We now turn to an exploration of whether the method variables influence our substantive analyses. We present a series of regression models in which we explore the selected method variables for each of our four program approach categories. The purpose of this exercise is to examine whether including method variables in the models leads us to doubt the relationships we see between our core components and program impacts. Exhibit C3 shows the analysis of all the method variables separately for each program approach. These findings are consistent with what we observed for the entire sample, with sample size and informant having meaningful (if not significant) relationships with effect size for all four approach categories.

Exhibit C3. Method Variables Analysis for Each Program Approach

	Family/Parenting			Relational			Skill-building			Academic-Educational		
Method Variables	**b**	**se**		**b**	**se**		**b**	**se**		**b**	**se**	
Intercept	0.76	0.64		0.34	1.07		0.86	0.28	**	-0.53	0.88	
Design: Individual and cluster random assignment	0.12	0.19		0.04	0.26		-0.23	0.11	*	0.05	0.37	
Comparison group level of service (higher scores=less service)	0.03	0.14		0.21	0.31		0.05	0.07		0.08	0.21	
Intervention and comparison group same context	-0.20	0.20		0.42	0.46		0.00	0.11		0.71	0.49	
Type of behavior: social adjustment	-0.09	0.15		-0.02	0.11		-0.03	0.09		-0.08	0.19	
Total sample size (winsorized)	-0.001	0.00	***	-0.004	0.00	***	-0.002	0.00	***	-0.002	0.00	***
Effect size adjusted for pretest	-0.11	0.20		-0.22	0.16		-0.15	0.11		-0.15	0.36	
Informant for outcome measure												
Subjects (self-reported)	-0.42	0.31		-0.26	0.27		-0.32	0.13	*	0.72	0.53	
Parents	-0.38	0.31					-0.15	0.14				
Teachers	-0.29	0.30		-0.24	0.25		-0.47	0.10	***	0.30	0.55	
Model Statistics												
Q-model	65.808			9.671			33.747	***		6.852		
Q-residual	87.801	***		104.642	***		252.894	***		47.804	***	
τ^2	0.109			0.172			0.039			0.189		
τ^2	0.000			0.011			0.058			0.024		
I^2	65.8%			77.1%			44.6%			79.9%		

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

Because of the small number of studies in most of our approach categories, our ability to conduct sensitivity analyses is somewhat limited. The purpose of these sensitivity analyses was to determine whether the inclusion of methods variables along with our substantive core components causes us to doubt our conclusions. Within these limits, we elected to explore how sample size and informant impacted the results of our analyses of the four approaches.

In the four exhibits below, Model 1 shows the original core component model. Model 2 adds sample size and informant. We see from these analyses that, with few exceptions, adding the method variables to the specific core components for each approach does not appreciably change the independent relationships of our core components to the effect sizes. Taken together, the fact that the method variables do not contradict our findings gives us confidence that the relationships of the core components to program impacts are robust.

Exhibit C4. Method Variables Analysis for Family Relations and Parenting Skills Approaches (*k* = 30; *n* = 50)

	Model 1	Model 2
Specific Core Components	**b (se)**	**b (se)**
Intercept	0.42 (0.13) ***	0.64 (0.26) *
Delivery format: one-on-one	0.35 (0.16) *	0.40 (0.16) *
Program duration (> than 10 weeks)	-0.15 (0.17)	-0.13 (0.17)
Session frequency (> than 1x/week)	-0.27 (0.27)	-0.23 (0.28)
Duration x Session frequency interaction	0.12 (0.35)	0.07 (0.40)
Implementation: Explicit or suggested problems	-0.60 (0.16) ***	-0.59 (0.20) **
Content element: Cognitive restructuring	0.13 (0.13)	0.17 (0.14)
Content element: Social and interpersonal skills	0.24 (0.17)	0.28 (0.18)
Methods Variables		
Sample size		0.00 (0.00) ***
Informant		
Parents		-0.43 (0.27)
Self-report		-0.44 (0.28)
Teacher		-0.28 (0.27)
Model Statistics		
Q-model	25.74 ***	33.45 ***
Q-residual	58.78 *	47.74 *
τ^2 (between)	0.05	0.05
τ^2 (within)	0.00	0.00
I^2	48.76%	44.56%
R^2	0.00%	0.00%

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

Exhibit C5. Method Variables Analysis for Relational Approaches (*k* = 24; *n* = 50)

	Model 1	Model 2
Specific Core Components	**b (se)**	**b (se)**
Intercept	0.30 (0.39)	0.53 (0.43)
Delivery format: one-on-one	0.25 (0.23)	0.17 (0.27)
Delivery setting: school-based (vs. community)	0.38 (0.22) †	0.42 (0.24) †
Delivery complexity	-0.003 (0.22)	-0.03 (0.24)
Implementation: Explicit or suggested problems	-0.14 (0.21)	0.04 (0.23)
Average age of sample	-0.02 (0.02)	-0.01 (0.03)
Methods Variables		
Sample size		0.00 (0.00) ***
Informant		
Self-report		-0.18 (0.30)
Teacher		-0.27 (0.27)
Model Statistics		
Q-model	6.93	11.82
Q-residual	101.64 ***	93.15 ***
τ^2 (between)	0.10	0.12
τ^2 (within)	0.02	0.02
I^2	69.07%	70.93%
R^2	0.00%	0.04%

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

Exhibit C6. Method Variables Analysis for Skill-building Approaches (*k* = 67; *n* = 155)

	Model 1	Model 2
Specific Core Components	**b (se)**	**b (se)**
Intercept	-0.03 (0.17)	0.26 (0.19)
Delivery format: in class (vs. community)	0.25 (0.15)	0.22 (0.15)
Delivery format: pullout in school (vs. community)	0.20 (0.12)	0.19 (0.12)
Program duration	-0.01 (0.00) ***	0.00 (0.00) ***
Session frequency	0.04 (0.02) *	0.04 (0.02) *
Implementation: Explicit or suggested problems	-0.38 (0.18) *	-0.42 (0.17) *
Content element: Specific social skills	0.20 (0.12) †	0.14 (0.11)
Methods Variables		
Sample size		0.00 (0.00) ***
Informant		
Self-report		-0.25 (0.13) *
Parents		0.00 (0.15)
Teacher		-0.36 (0.11) **
Model Statistics		
Q-model	20.05 **	42.09 ***
Q-residual	287.92 ***	246.09 ***
τ^2 (between)	0.04	0.03
τ^2 (within)	0.07	0.01
I^2	49.98%	42.97%
R^2	0.00%	0.00%

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

Exhibit C7. Method Variables Analysis for Academic-Educational Approaches (*k* = 15; *n* = 23)

	Model 1	Model 2
Specific Core Components	**b (se)**	**b (se)**
Intercept	0.21 (0.17)	0.57 (0.19) **
Program duration (> than 30 weeks)	0.58 (0.24) **	0.62 (0.21) **
Implementation: Explicit or suggested problems	-0.58 (0.27) **	-0.69 (0.21) **
Content element: Personal development	-0.27 (0.21)	-0.31 (0.18)
Methods Variables		
Sample size		0.00 (0.00) ***
Informant		
Self-report		-0.21 (0.20)
Model Statistics		
Q-model	8.16 *	20.31 ***
Q-residual	56.53 ***	33.45 **
τ^2 (between)	0.09	0.02
τ^2 (within)	0.03	0.04
I^2	69.98%	52.64%
R^2	0.00%	0.00%

Note. The table reports unstandardized regression coefficients (b) and standard errors (se) from inverse variance weighted multi-level random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

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The studies from the larger meta-analytic database examined in this paper are listed below and organized by our internal study identification numbers. These numbers are arbitrary and serve only to identify the different studies in the database and the (often) several articles or reports that comprise each study.

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50035	Alper, T. G., & Kranzler, G. D. (1970). A comparison of the effectiveness of behavioral and client-centered approaches for the behavior problems of elementary school children. *Elementary School Guidance and Counseling, 5*, 35-43.
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50046	Antshel, K. M. (2000). *Social competence of children with attention deficit hyperactivity disorder: The effect of social skills instruction* (Doctoral dissertation). Available from ProQuest Dissertations and Theses. (AAT 9968080)
50055	August, G. J., Hektner, J. M., Egan, E. A., Realmuto, G. M., & Bloomquist, M. L. (2002). The Early Risers longitudinal prevention trial: Examination of 3-year outcomes in aggressive children with intent-to-treat and as-intended analyses. *Psychology of Addictive Behaviors, 16*(4S), S27-S39.
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