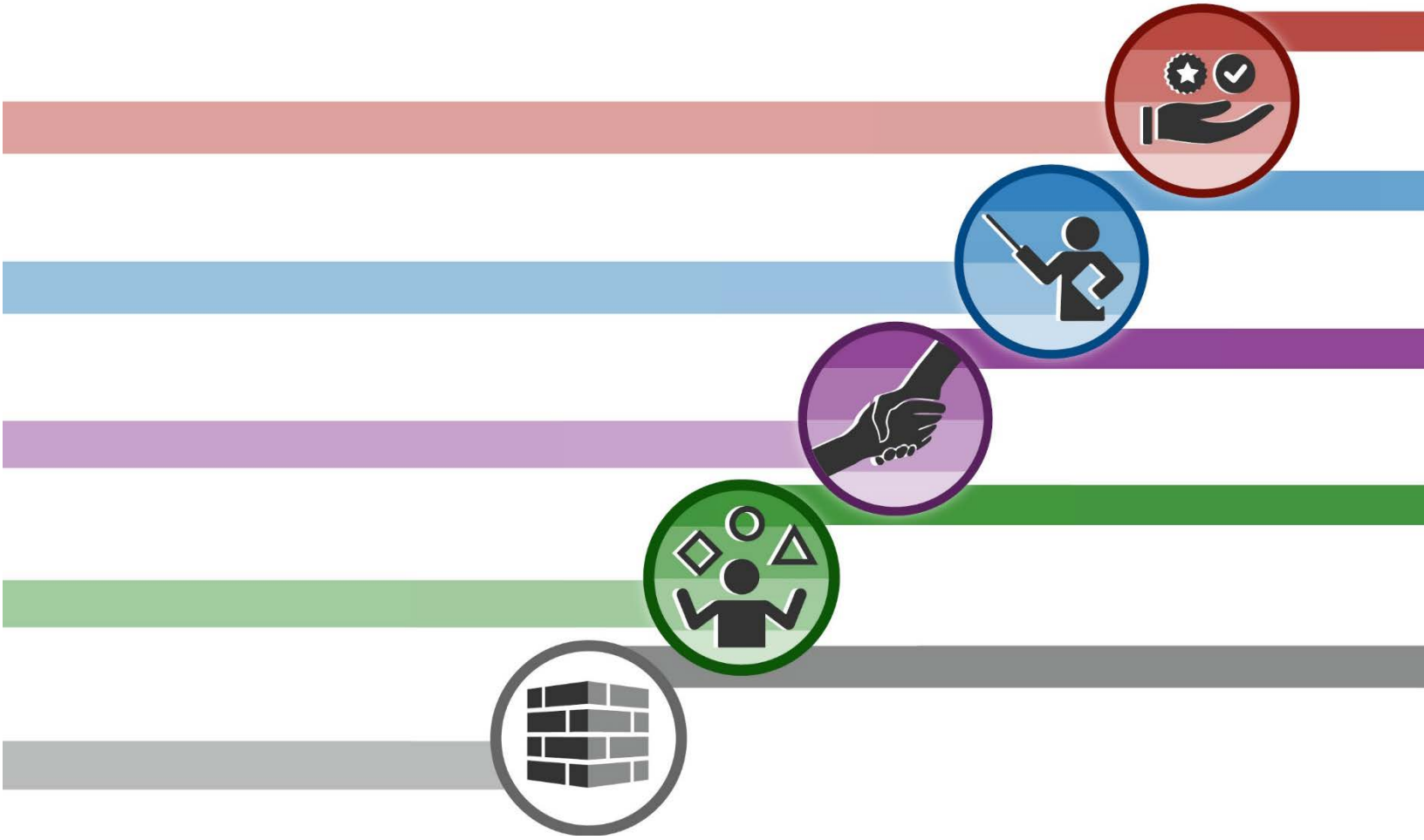
Developing Evidence-based Practice Guidelines for Youth Programs

Technical Report on the Core Components of Interventions that Address Externalizing Behavior Problems



DEVELOPING EVIDENCE-BASED PRACTICE GUIDELINES FOR YOUTH PROGRAMS

Technical Report on the Core Components of Interventions that Address Externalizing Behavior Problems

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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.

Table of Contents

List of Exhibits

Executive Summary

This report describes and illustrates an approach to using evidence to improve the effectiveness of youth programs. 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 applies a way of thinking about evidence that differs from the traditional "model program" approach. This "core components" way of thinking 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 of factors associated with: (1) program approach or content; (2) structure, format, and delivery of the program; (3) implementation strategies and problems; and (4) 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 externalizing behavior problems. We group the prevention programs into the following categories based on their general approach to behavior change:

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

Findings

Across the diverse prevention programs in the dataset, the overall average program effect on externalizing behavior is positive, statistically significant, and represents meaningful effects on the externalizing behavior of the youth who participated in the programs ($\bar{g}$ = 0.32, p < .0001). This means that about 63% of youth participants in prevention programs exhibited better outcomes (less externalizing behavior problems) than the average comparison group participant. In addition, the five program approaches each exhibit statistically significant impacts on externalizing behavior problems and each has sufficient variability to explore core components within the group. Our meta-regression analysis focused on: (1) identifying general core components that apply across all programs in the dataset and (2) discovering core components that apply separately within each program approach.

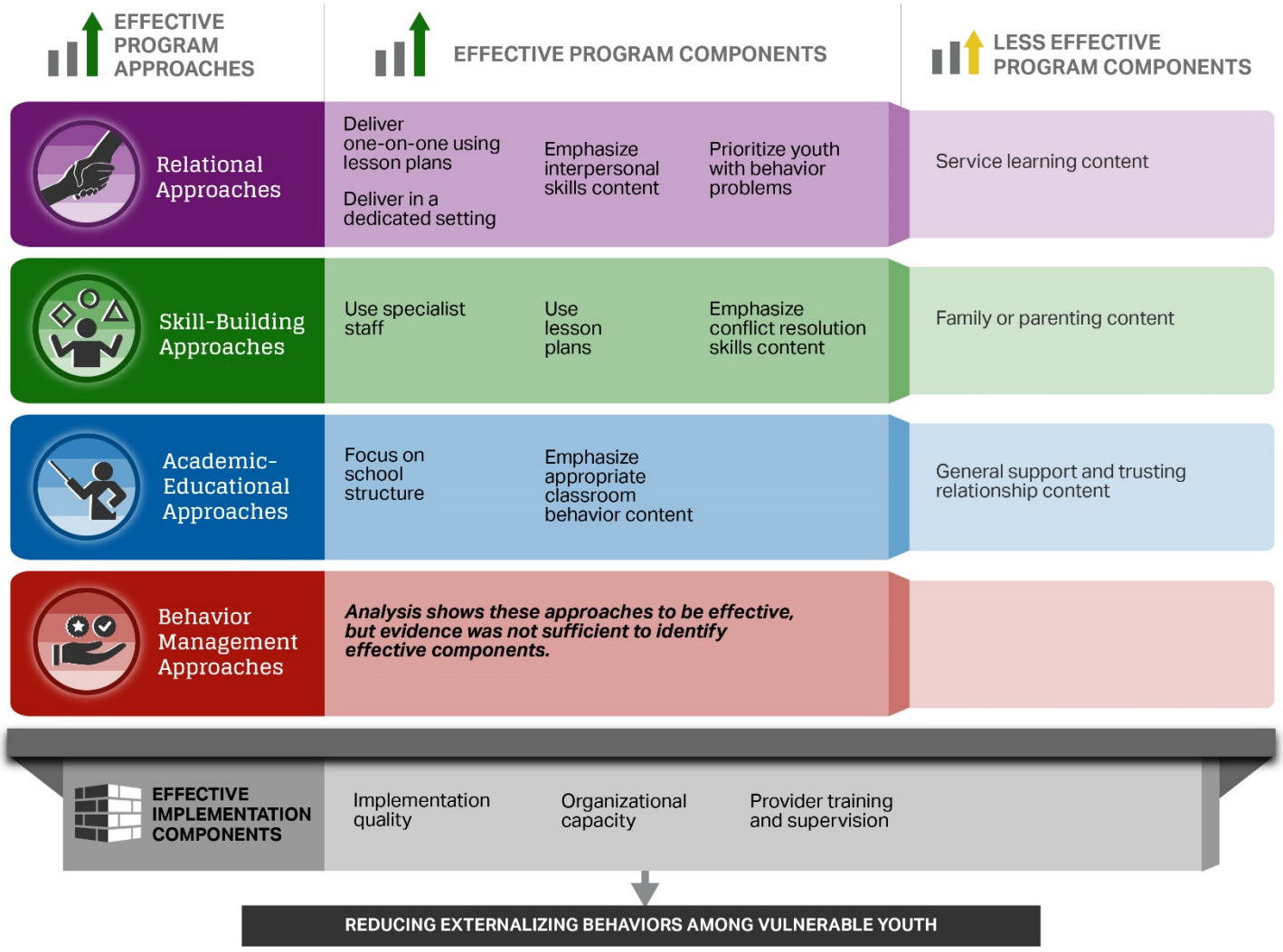
General Core Components

We identified three general core components, all representing facets of implementation, which were associated with program effects across the full set of prevention programs.

- Implementation quality
- Delivery complexity
- Provider training or supervision

Specific Core Components

For four of the approaches, we identified specific core components in one or more of our core components domains that were meaningfully associated with program impacts on youth externalizing behavior. The evidence roadmap below summarizes the findings from our meta-regression analyses. Each of the factors in the roadmap will form the basis for a practice recommendation.



1 Introduction

Although 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, 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. Prevention programs that target youth violence, aggression, bullying, and other negative behaviors and those that support 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 report focuses on identifying core components for prevention programs that target youth externalizing behavior problems. 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 will 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 selected and indicated prevention programs for youth, all of which provide evidence of program effects on externalizing behavior problems. 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 behavior 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 collecting any program that reports 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.

We selected externalizing problem behavior as the outcome domain of interest. Externalizing problem behaviors are defined as negative behaviors such as aggression, acting out, hostility, bullying, disobedience, and the like that are enacted overtly in the external world.[1] The negative behaviors assessed within this domain like acting out, aggression, and disciplinary actions can be extremely disruptive, are often correlated with other problem behaviors, and tend to have far-reaching consequences for children and youth. Programs that target externalizing behaviors are diverse and common in both school and community settings, so the audience for practice guidelines in this area may be large.

From this larger database, we selected the 391 programs that report program impacts on externalizing problem behavior. The 391 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 behavioral, academic, or family difficulties associated with externalizing behavior. The outcomes themselves are diverse; they index a variety of behaviors ranging from anger, disobedience, and disruptiveness to verbal and physical aggression. Most of the measures are collected via surveys or questionnaires reported by teachers, parents, or the children and youth themselves, but the database also includes measures taken from administrative records, such as school disciplinary actions. Appendix A includes additional descriptive detail about the outcomes and Appendix B provides information about how we selected and aggregated outcomes from the candidate studies.

The record for each study we selected for analysis provides estimates of program impacts (i.e., 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.

[1] Although delinquent behavior such as arrests, convictions, court contacts, and the like is included in the broad definition of externalizing problem behavior, it is considered a separate outcome in the meta-analytic database and is not included in the analyses reported here.

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 behavior and emotions (e.g., social problem solving skills, anger management) and those focused on other targets such as parenting or academic difficulties that may also influence externalizing behavior. 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:

Family Relations and Parenting Skills (72 studies). 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 child 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 Approaches (91 studies). 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 relational 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 (121 studies). 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 externalizing behavior. 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 (27 studies). 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 modify problem behavior directly or modify the precursor behaviors that are risk factors for problem behavior.

Academic and Educational Interventions (75 studies). Programs in this group aim to improve school performance, school engagement, and academically-oriented behavior. Academic performance is a risk factor for externalizing behavior, which can manifest in school settings. Although not generally the primary focus, programs with an academic or educational focus may provide collateral benefits on youth behavior by promoting positive youth development in general. Many programs in this group also include elements focused on behavior. 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 (5 studies). 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 deterrence approaches and the child-coping programs (within Family Relations and Parenting Skills Approaches) were dropped from the analyses because so few programs were included in these categories (n=13 total). Thus, five approach categories were carried through our analyses.

2.2 Other Program Features and Characteristics

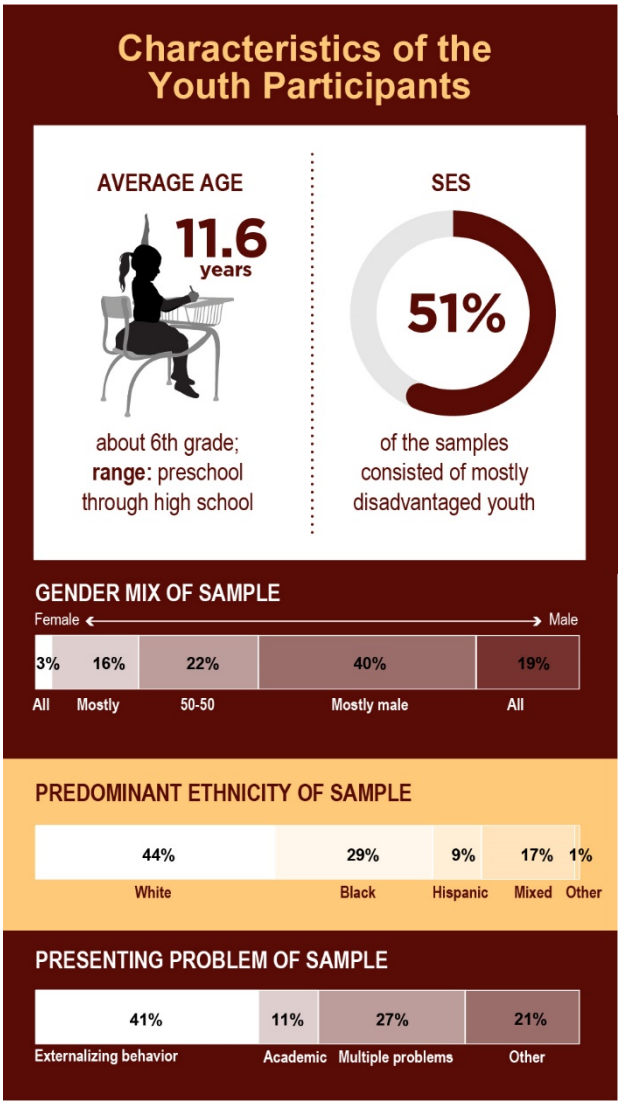
The prevention programs in the database also vary in their staffing, configurations, resources, and program length, among other features. We have grouped these potential core components into four domains: program content, program structure, implementation strategies and outcomes, and participant characteristics. 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 391 programs are included in Appendix A.

- **Program content**
  - Program approach. Each program was coded into one of the five 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
  - Delivery format: individual, group, classroom
  - Program standardization
    - Program protocol: has manual, program guide
    - Lesson plans: specified number of sessions and session content vs. less structured
  - Delivery complexity: counts of formats, provider types, and settings
  - Program dosage
    - Duration in weeks from beginning to end
    - Frequency of sessions per week
  - Program personnel
    - Delivery personnel: researcher, specialist, teacher, layperson, etc.

- **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
  - Predominant race/ethnicity of 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 Externalizing Behavior

Before we identify the profile of core components associated with positive program impacts, we first look at the overall effects of youth programs on externalizing behavior problems and the distribution of those effects. Across the 391 programs in the dataset, the overall average program effect on externalizing behavior is positive, statistically significant, and represents meaningful effects on externalizing behavior among youth who participated in the programs ($\bar{g}$ = 0.32, p < .0001). Expressed in percentage terms, this average effect size of 0.32 means that about 63% of youth participants in prevention programs exhibited better outcomes (less externalizing behavior) than the average comparison group participant.

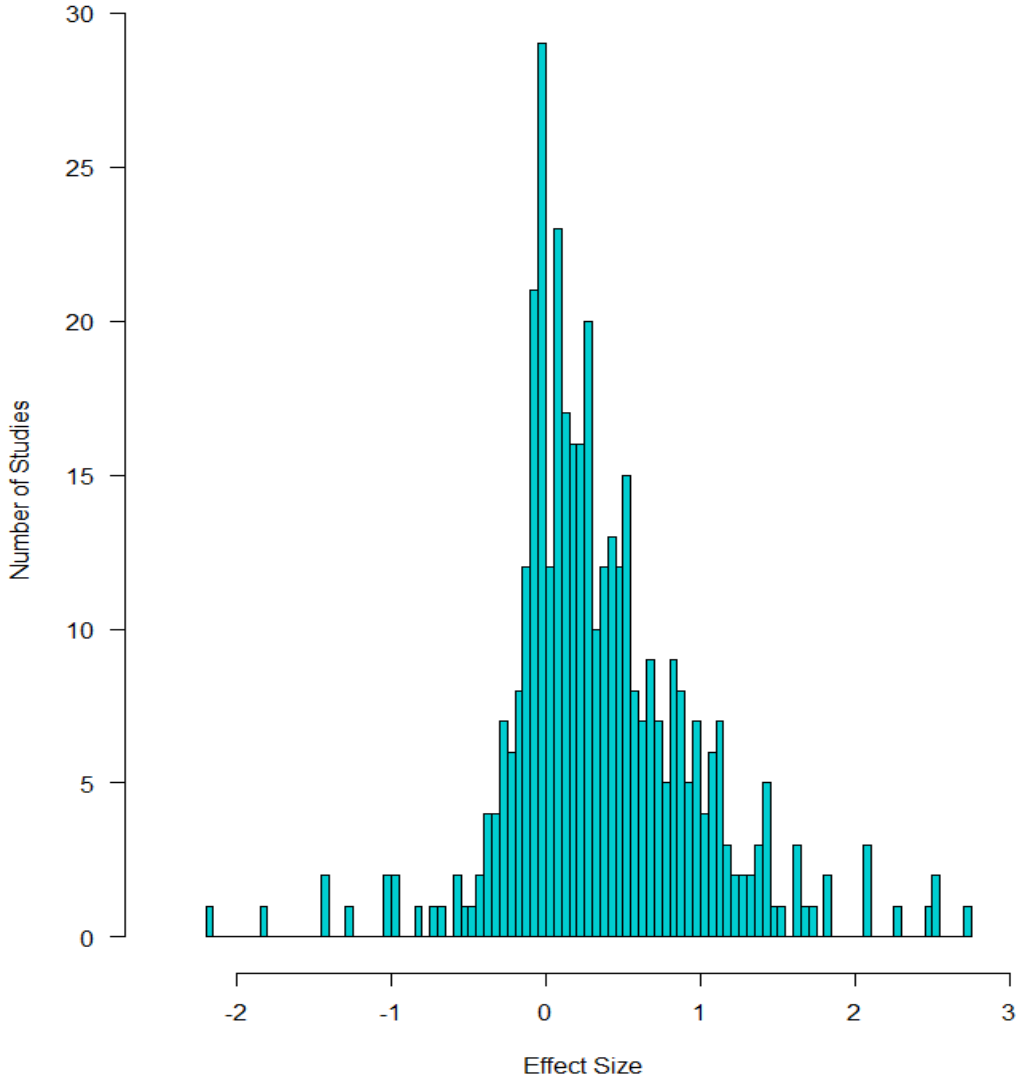
In the results below, we will use a threshold of .10 effect size units as an indicator of a relatively meaningful difference, rather than relying solely on statistical significance. The random effects models we use in all analyses are conservative. If we focus only on statistical significance from such models, we may overlook findings that are substantively meaningful. There 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 externalizing behavior. That is, subtracting or adding .10 from our mean effect size of 0.32 translates into a range of 59%-66% of program participants exhibiting less externalizing behavior 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 391 programs we analyze here, there is a great deal of heterogeneity (Q = 2506, p <.05; I^2=83.08%; τ^2=.26). 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 represents the between-study portion. 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. The τ^2 statistic is a direct estimate of the between-study variance. The square root of τ^2 is often used to describe the range of the between-study effects. For example, for a mean effect size of 0.32 and a τ of .51 (the square root of our τ^2 of .26), we can expect that about 95% of the distribution of between-study effects will fall between -0.68 and 1.32 (i.e., 0.32 +/- 1.96*τ), a rather large range.

To further illustrate this variability, Exhibit 1 shows the distribution of observed effect sizes across the 391 programs. Some programs were not especially effective; programs clustering around zero are those in which there were no or very small differences between the intervention groups and the comparison groups after intervention. Programs on the left side of the graph are those in which comparison groups exhibited greater reductions in behavior problems than intervention groups. Programs on the left side of the distribution might give us some clues about practices to avoid. Fortunately, most programs (72%) showed positive effects and many of these represent meaningful levels of behavior change. For example, the median effect size of 0.26 translates to a 10 percentage point improvement in externalizing behavior. *This variability motivates and provides the ideal circumstance for us to identify the factors that characterize the most effective programs in this distribution.* Our next step is to identify those factors.

Exhibit 1. Observed Variability in the Effect Size Distribution



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 externalizing behavior.

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 externalizing outcomes 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.

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, academically-focused programs tend to be longer than skills-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 and, when possible, we grouped related variables together in composites. In addition, we performed some analyses separately for the five program approach categories to better isolate the core components that might interact with the approach categories if all programs were analyzed together.

Further, we hypothesized that, given the diversity of programs and settings in the database, there might be core components that are unique to certain program approaches as well as core components that might be more generally associated with positive effects across programs. We, therefore, performed the analyses to identify the core components in two stages.

4.3 Stage 1 Analysis: General Core Components

In the first stage, we identified core components that should be important for any program – we call these *general core components*. We selected options for this first phase from the implementation strategies and problems domain because we expected these features to apply broadly across different types of programs and settings even if, for example, different program approaches were more or less likely to experience implementation problems or were more or less complex.

4.4 Stage 2 Analysis: Specific Core Components

In the second stage of our analysis, we turned our focus to core components that might be important only for certain program approaches (e.g., program duration may be important for some program approaches but not others, or may not vary at all for some). We call these *specific core components*. For this stage, we focused on potential core components in the other three domains of program and participant features captured in the meta-analytic database: program content, program structure, and participant characteristics. We performed these analyses separately for each of the five approach categories. 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 may need to be tailored to the approach categories so that practitioners can more easily find guidance that is relevant for the kinds of programs they implement.

4.5 Sensitivity Analysis

Once we identified the specific core components for each of the five program approach categories, we double checked the general core components to be sure that those relationships held for each of them. We suspected that, because of variations across the approaches in the correlations between general and specific core components, these relationships might not always hold when we subset the data and add additional variables. In the results, we point out places where this occurs. 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.

4.6 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 externalizing behavior, 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 Stage 1: General Core Components

We selected four potential core components from the implementation strategies and problems domain for the first stage analysis: implementation quality, delivery complexity, provider training, and provider supervision. Descriptive statistics for these variables are shown in Exhibit 2 along with their correlations with effect size.

Implementation quality was analyzed as a binary variable, with a 1 indicating that the study authors explicitly mentioned problems or implied that there were problems with implementation. There was considerable variability across programs in what (and how much) studies reported about program implementation. For instance, some studies simply stated that programs experienced problems with implementation, but provided no additional information on specific types of problems. More commonly, studies reported difficulties related to staffing or funding, intervention group participants receiving less intervention contact than intended, or intervention group participants not receiving the entire intervention. A substantial number of studies did not mention implementation at all (56%); these cases are included in the reference category. Few studies explicitly stated that they had no problems with implementation (5%).

Delivery complexity 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). See Appendix B for the factor analysis results. Provider training prior to delivery of the program being delivered and provider supervision during program delivery were coded as binary variables, with a 1 indicating the presence of training or supervision, respectively. For analysis, the provider training and provider supervision variables were combined in a single variable that indicates whether provider training or provider supervision or both were mentioned in a study.

Exhibit 2. Descriptive Statistics for General Core Components: All Programs (k=391)

	Frequency (%)	Mean (sd)	Range (Mode)	Correlation with Effect Size
Implementation Quality				
Explicit or suggested problems	153 (39%)			-0.14
No problems or no mention of problems	239 (61%)			
Delivery Complexity				
Number of different settings		1.50 (0.86)	1-6 (1)	
Number of different delivery personnel		1.75 (1.00)	1-5 (1)	
Number of different formats		1.82 (1.10)	1-8 (1)	
Delivery complexity factor		0.00 (1.00)		-0.26
Provider Training				
No	181 (46%)			
Yes	210 (54%)			0.19
Provider Supervision				
No	230 (59%)			
Yes	161 (41%)			0.02
Provider Training or Supervision				
No	163 (42%)			
Yes	228 (58%)			0.09

The results of the analysis of the general core components with all of them included in a meta-regression model predicting effect sizes are shown in Exhibit 3. **Implementation problems and delivery complexity were associated with smaller program impacts. Provider training or supervision was associated with larger program impacts**. The coefficients in

the regression model represent the amount of change on the dependent variable (the effect size) associated with a one unit change on the core component. For example, studies for which provider training or supervision was reported show, on average, effects 0.12 effect size units larger than studies that did not report training or supervision. Although the general core components account for significant variability in the distribution of effects (the Q-test for the model is statistically significant), the significant Q-residual and large I^2 and τ^2 values indicate that substantial effect size differences among programs remain that are not accounted for by the three general core components.

Exhibit 3. General Core Components (k=391)

General Core Components	b (se)[a]
Intercept	0.31 (0.05) ***
Implementation: Explicit or suggested problems	-0.12 (0.06) †
Delivery complexity	-0.11 (0.03) ***
Provider training or supervision	0.12 (0.06) *
Model Statistics	
Q-model	26.10 ***
Q-residual	2289.87 ***
τ^2	0.24
I^2	81.65%
R^2	8.22%

[a] Unstandardized regression coefficients (b) and standard errors from inverse variance weighted random effects meta-regression analyses using REML estimation.
† p<.10, * p<.05, ** p<.01, *** p<.001

The implementation problems variable provides a direct assessment of the relationship of implementation quality with program effects. The variability in the type of problems experienced and the varied level of detail with which it is reported makes it difficult to derive specific guidance directly from the studies in the database. Our single implementation problems variable did not focus solely on fidelity. That is, we recorded any mentioned issues with implementation, including attendance at sessions by participants, provider turnover, fidelity to a manual or guidelines, incomplete service delivery, number of sessions delivered, and the like as an implementation problem. Although the quality and quantity of information reported about implementation varies across the studies in the database, it is clear that implementation matters.

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 fact, there was a small non-significant interaction between implementation and delivery complexity suggesting that programs with high delivery complexity that did not have explicit implementation problems performed slightly better than less complex programs without explicit implementation problems. 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.

Finally, programs for which provider training or supervision were mentioned exhibit better outcomes than those for which supervision and training were not. Training can improve the quality of program delivery, but building capacity in service providers is likely to yield other implementation-related benefits as well, including supporting staff retention and building a cohesive service environment. We will see below that training and supervision appear to be less critical for some program approaches with explicit lesson plans or manuals, but that does not negate its potential to further improve the quality of service delivery.

In the next section, we separate the programs into the five approach categories and explore the core components that are important for each category. These, along with the general core components we have explored here, serve as the basis for the practice guidelines we will develop in the next phase of this work.

6 Stage 2: Core Components for Different Program Approaches

For the second phase of our analysis, we separated the diverse programs that aim to reduce externalizing behaviors into the five program approach categories with sufficient evidence to analyze. We hypothesized that programs characterized by different approaches to changing behavior might exhibit different configurations of core components. In addition, we expect that practice guidelines might be more useful for practitioners if they are focused separately on the five program approaches.

Exhibit 4 shows the mean effect sizes and heterogeneity statistics for the five program approach groups. All five of the broad program approaches have statistically significant impacts on externalizing behavior problems. In addition, each has sufficient variability to explore core components within the group, as evidenced by the statistically significant Q-statistics, and large I^2 and τ^2 values.

Exhibit 4. Mean Effect Sizes and Heterogeneity Statistics for the Program Approach Categories

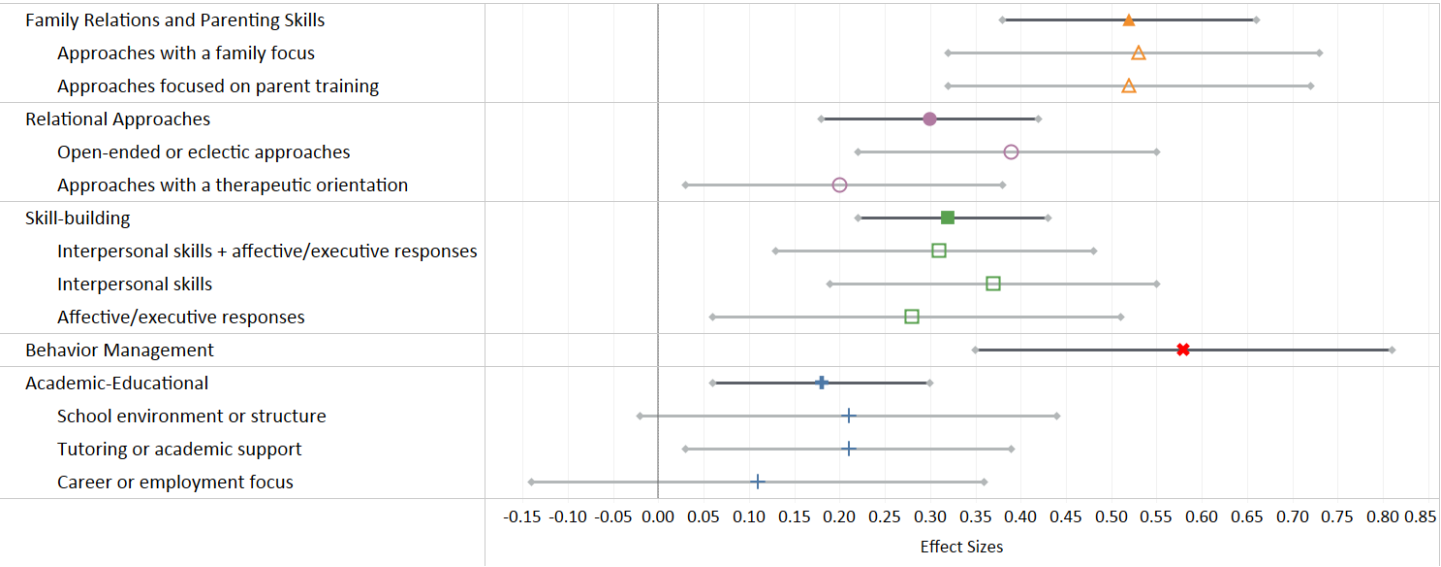
	k	Mean Effect Size	se	LCI	UCI	τ^2	I^2	Q
Family Relations and Parenting Skills	*64*	*.52**	*0.07*	*0.38*	*0.66*	*.19*	*78.61*	*392**
Approaches with a family focus	30	.53*	0.10	0.32	0.73	.29	85.26	297*
Approaches focused on parent training	34	.52*	0.10	0.32	0.72	.08	58.48	76*
Relational Approaches	*91*	*.30**	*0.06*	*0.18*	*0.42*	*.28*	*80.60*	*357**
Open-ended or eclectic approaches	47	.39*	0.08	0.22	0.55	.22	79.79	183*
Approaches with a therapeutic orientation	44	.20*	0.09	0.03	0.38	.35	79.76	173*
Skill-building	*121*	*.32**	*0.05*	*0.22*	*0.43*	*.18*	*66.50*	*369**
Interpersonal skills + affective/executive responses	45	.31*	0.09	0.13	0.48	.10	55.29	98*
Interpersonal skills	46	.37*	0.09	0.19	0.55	.33	78.13	221*
Affective/executive responses	30	.28*	0.11	0.06	0.51	.08	38.73	46*
Behavior Management	*27*	*.58**	*0.12*	*0.35*	*0.81*	*.19*	*67.89*	*794**
Academic and Educational Approaches	*75*	*.18**	*0.06*	*0.06*	*0.30*	*.29*	*91.26*	*702**
School environment or structure	21	.21	0.12	-0.02	0.44	.42	94.22	314*
Tutoring or academic support	37	.21*	0.09	0.03	0.39	.35	89.43	330*
Career or employment focus	17	.11	0.13	-0.14	0.36	.05	75.38	56*

Note. k = number of studies contributing to the mean effect size estimate; se = standard error of the estimate; LCI and UCI are the lower and upper 95% confidence interval boundaries; τ^2 is an estimate of the between-studies variance; I^2 is the proportion of between-studies variance to the total variance; Q is an index of the total amount of study-to-study variation.
*p<.05

Across the five approaches, the confidence intervals overlap for all approaches except academic and educational approaches (Exhibit 5). Academic and educational approaches are effective, as evidenced by the positive, statistically significant mean effect, but are less effective overall than family relations and parenting skills approaches and behavior management approaches. 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.

The differences in the magnitude of the average effects across the five approach groups are large enough that they might obscure the relationships of other core components to the outcomes. Thus, there are both practical reasons (i.e., practice guidelines might be more useful if separated by program approach) and empirical reasons (i.e., differences in average effects between programs might obscure the relationships of moderators to the outcome) to explore the core components separately for each program approach.

Exhibit 5. 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 three domains: 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.

- 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
- 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 the three potential core components that were ordinal (program frequency, gender mix, and SES). Two potential core components were scaled continuously, program duration and average age of the sample. For these variables, if a 10 week change on duration or 3 year change on age was associated with +/- .10 in the effect size, the variable was considered meaningful. These values represent approximately half of a standard deviation for each variable. More details about the specifics of our analysis are included in Appendix B.

6.1 Core Components for Family Relations and Parenting Skills Approaches

The key features of the family relations and parenting skills approaches are shown in Exhibit 6 along with the correlations between selected features and effect sizes. Programs in this group averaged about 15 weeks in duration, typically offering sessions once a week. Most programs were community-based (rather than school-based). Specialist staff (e.g., social workers, clinicians) were the most common delivery personnel after researchers and all other types of personnel. Content elements were varied, with many focused on family relations or parenting, as expected. A non-trivial number of programs also included content for youth, including personal development and interpersonal or social skills.

Exhibit 6. Characteristics of Family Process and Parenting Skills Approaches (k=64)

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality			Approach Subcategory		
Explicit or suggested problems	28 (44%)	-0.05	Family focus	30	0.21
No problems or no mention of problems	36 (56%)		Parent training focus	34	
Delivery Complexity			Content Elements		
Number of different settings	1.9 (1.1)	-0.17	Relaxation skills training	2	
Number of different delivery personnel	1.8 (0.9)	-0.07	Appropriate classroom behavior	3	
Number of different formats	1.5 (0.9)	-0.20	Problem solving sequence	8	
Delivery complexity factor	0.05 (1.0)	-0.19	Empathy	1	
Provider Training or Supervision			Attribution retraining	7	
Yes	49 (77%)	0.11	Moral development training	0	
Dosage			Self-statements to inhibit impulsiveness or promote positive behavior	1	
Duration (weeks)	15.1 (13.6)	-0.20	Interpersonal, social skills	16	-0.20
Frequency (sessions/week)		-0.04	Conflict resolution	3	
Less than weekly	7 (11%)		Assertive communication skills	0	
1x/week	38 (59%)		Personal development	14	0.39
More than 1x/week	18 (30%)		Identifying, understanding feelings	4	
Setting			Trusting relationship with caring adult		
Classroom-based	7 (11%)	-0.22	General personal or social support	1	
School-based pullout	2 (3%)	0.25	Behavioral coping skills for anger/aggression	2	
Community-based	55 (86%)	0.08	Problem solving sequence for anger/aggression	2	
Delivery Personnel			Attribution retraining for anger/aggression	0	
Researcher	21 (33%)	0.09	Self-statements to inhibit anger/aggression	0	
Specialist staff	23 (36%)	-0.13	Angry behavior cycle	0	
Laypersons, mixed personnel types, and others	20 (31%)		Parent skills training	53	-0.03
Format			Parent functioning	17	0.13
Group of parents/families	25 (39%)	0.08	Social support, building support network	8	
One-on-one	21 (33%)	0.04	Family communication skills	37	0.27
All other formats	18 (28%)		Engagement with child's school	7	

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Lesson Plans			Information provision for families	0	
Yes	40 (63%)	0.29	Academic, educational	7	
Participant Characteristics			School structure	0	
Presenting Problem=behavior	38 (59%)	-0.16	Service learning	1	
Age	9.4 (4.1)	0.10	Self-sufficiency skills		
Gender mix		-0.08	Health education and promotion	1	
No males (<5%)	1 (2%)		Provide basic needs	3	
Some males (<50%)	9 (14%)		Recreational	5	
50-60% male	11 (17%)		Employment, vocational		
Mostly males (>60%)	35 (55%)		Case management, service brokerage	2	
All males (>95%)	8 (13%)		Parenting skills for youth	1	
Predominant race/ethnicity			Unspecified	1	
White	44 (69%)	-0.08	Violence and drug use education	3	
Black	6 (9%)				
Hispanic	5 (8%)				
Other minority	1 (2%)				
Mixed, none > 60%	8 (13%)				
SES		-0.02			
Low	29 (45%)				
Middle	22 (34%)				
Upper middle	13 (20%)				

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 reported only for variables or categories within categorical variables with at least 10 cases in the category.

We present three core components meta-regression models for the family process and parenting skills approaches in Exhibit 7. Model 1 shows the specific core components associated with the programs in this category. Model 2 adds the general core components so we can explore whether the relationships of the general factors with program impacts hold when the specific core components are included. The third model shows only the general factors to explore whether the general factors apply within the subset of family process and parenting skills approaches. These latter two models are reported mainly to address questions about the robustness of the findings. If we see differences in the relationships of the general core components to outcomes when they are considered alongside the specific core components or when they are considered within the program approach subgroups, this may be a sign of a confound.

Recall that potential core components were considered for inclusion based on their relationships with effect size (see Appendix C) and were retained in Model 1 if the coefficients met our threshold for meaningful differences. Five specific core components were independently associated with effective family process and parenting skills approaches based on the thresholds for meaningful relationships we discussed earlier. Although none of the potential core components were statistically significant, the magnitude of their relationships with the effect sizes suggests that a change on the core component is associated with a meaningful difference on the outcome. **Family relations and parenting skills programs in which services were delivered in one-on-one formats tended to show more positive outcomes than those with group formats. Programs that were lesson-plan-based also showed larger impacts than programs that were less structured.** Two specific content elements were associated with program impacts: **family communication skills and personal development elements were both associated with larger average impacts.** Finally**, family process and parenting skills approaches were slightly more effective with younger children.**

Exhibit 7. Core Components for Family Process and Parenting Skills Approaches (k=64)

	Model 1	Model 2	Model 3
Specific Core Components	b (se)	b (se)	b (se)
Intercept	0.51 (0.24) *	0.62 (0.19) **	0.62 (0.15) ***
Delivery format: one-on-one	0.11 (0.16)	0.13 (0.18)	
Lesson-plan-based program	0.19 (0.15)	0.20 (0.18)	
Age of sample	-0.03 (0.02)	-0.02 (0.02)	
Content element: Family communication skills	0.12 (0.14)	0.11 (0.15)	
Content element: Personal development	0.15 (0.17)	0.16 (0.18)	
General Core Components			
Implementation: Explicit or suggested problems		-0.10 (0.14)	-0.11 (0.14)
Delivery complexity		0.01 (0.08)	-0.05 (0.07)
Provider training or supervision		-0.11 (0.17)	-0.05 (0.16)
Model Statistics			
Q-model	5.70	6.45	1.76
Q-residual	295.64 ***	290.54 ***	368.60 ***
τ^2	0.18	0.20	0.20
I^2	76.86%	77.09%	78.17%
R^2	3.48%	0.00%	0.00%

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

Model 2 indicates that the relationship of delivery complexity with program impacts within this approach group is somewhat attenuated from what we observed in the analysis of all programs combined. We think this may be due to the fact that a large number of programs in this group are lesson-plan-based, which may protect against difficulties in implementation associated with high delivery complexity. In addition, the relationship between complexity and provider training or supervision for this group of approaches results in neither variable having a strong independent relationship with effect size in Model 3, although both variables have non-trivial univariate relationships (see Exhibit 6).

Across all the models for the family process and parenting skills approaches, the Q-model values are not statistically significant and the percent of variance accounted for by the models (R^2) is small. This means that, although the core components do have meaningful relationships with the effect sizes, differences among the programs remain that are not accounted for by the core components we have to work with. 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.

6.2 Core Components for Relational Approaches

The key features of the relational approaches are shown in Exhibit 8. Programs in this group are almost twice as long in duration on average as those in the previous group of family relations and parenting skills approaches. All settings (in-class, at school but in pull-out format, and in community) are about equally represented, in contrast to the previous group which contained primarily community-based programs. A quarter of the programs delivered services primarily in a one-on-one format. The youth participants were also considerably older than those in the previous group (13 years for this approach category vs. 9 years across all programs). Interpersonal, social skills and personal development were common content elements, as were academic or educational elements, service learning, and parenting skills for youth. There is a small group of programs in this approach category focused on teen pregnancy prevention that included service learning and parenting skills for the youth participants, which explains the prevalence of these latter two elements in this group.

Exhibit 8. Characteristics of Relational Approaches (k=91)

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality			Approach Subcategory		
Explicit or suggested problems	24 (26%)	-0.09	Open-ended or eclectic	47	0.01
No problems or no mention of problems	67 (74%)		Particular orientation or structure	44	
Delivery Complexity			Content Elements		
Number of different formats	1.7 (0.6)	-0.19	Relaxation skills training	0	
Number of different provider types	1.4 (0.8)	-0.11	Appropriate classroom behavior	12	0.15
Number of different settings	1.6 (0.8)	-0.17	Problem solving sequence	2	
Delivery complexity	-0.11 (0.7)	-0.21	Empathy	0	
Provider Training or Supervision			Attribution retraining	3	
Yes	37 (41%)	0.22	Moral development training	0	
Dosage			Self-statements to inhibit impulsiveness or promote positive behavior	1	
Duration (weeks)	28.3 (21.2)	-0.28	Interpersonal, social skills	51	-0.04
Frequency (sessions/week)		-0.12	Conflict resolution	2	
Less than weekly	9 (10%)		Assertive communication skills	0	
1x/week	32 (35%)		Personal development	65	-0.00
2x/week	36 (40%)		Identifying, understanding feelings	10	0.09
More than 2x/week	13 (15%)		Trusting relationship with caring adult	18	-0.15
Setting			General personal or social support	7	
In-class	31 (34%)	-0.25	Behavioral coping skills for anger/aggression	0	
Pullout	34 (37%)	0.27	Problem solving sequence for anger/aggression	2	
Community	26 (29%)	-0.02	Attribution retraining for anger/aggression	0	
Delivery Personnel			Self-statements to inhibit anger/aggression	0	
Researcher	19 (21%)	0.18	Angry behavior cycle	2	
Specialist staff	25 (28%)	-0.12	Parent skills training	6	
Laypersons	31 (34%)	-0.08	Parent functioning	1	
All others	16 (17%)		Social support, building support network	2	
Format			Family communication skills	5	
One-on-one (vs. group)	23 (25%)	0.21	Engagement with child's school	5	
Lesson Plans or Content Focused			Information provision for families	2	
Yes	6 (7%)		Academic, educational	20	-0.17

	Frequency (%) Mean (sd)	Correlation with Effect Size
Participant Characteristics		
Presenting Problem=behavior	29 (32%)	0.30
Age	13.4 (3.2)	-0.13
Gender mix		0.23
No males (<5%)	5 (6%)	
Some males (<50%)	24 (26%)	
50-60% male	15 (17%)	
Mostly males (>60%)	23 (25%)	
All males (>95%)	24 (26%)	
Predominant race/ethnicity		
White	35 (39%)	0.20
Black	28 (31%)	
Hispanic	10 (11%)	
Other minority	0 (0%)	
Mixed, none > 60%	18 (20%)	
SES		0.06
Low	52 (57%)	
Mid	29 (32%)	
High	10 (11%)	

	Frequency	Correlation with Effect Size
School structure	0	
Service learning	23	-0.19
Self-sufficiency skills	0	
Health education and promotion	2	
Provide basic needs	1	
Recreational	12	0.09
Employment, vocational	3	
Case management, service brokerage	8	
Parenting skills for youth	22	-0.20
Unspecified	1	
Violence and drug use education	6	

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 reported only for variables or categories within categorical variables with at least 10 cases in the category.

Exhibit 9 shows meta-regression Model 1 with specific core components; Models 2 and 3 explore the general core components for this approach category. The analysis identified five core components for the relational approaches. **One-on-one formatted programs were associated with better outcomes than group-based formats. Programs delivered in schools for which participants were pulled out of class for services were also associated with better outcomes than programs delivered in class or in community settings.** Two content elements were associated with program impacts. **The set of programs with a service learning component were less effective overall than the other relational approaches without this component. Programs that included any content element relating to interpersonal skills exhibited better outcomes than relational approaches that did not include these elements.**

One participant characteristic was associated with better outcomes; programs in which the youth participants were selected as a result of behavioral issues performed better than programs in which the youth were selected as a result of other risk factors, which included academic difficulties, mental health issues, family conflict, or multiple risk factors. Youth with behavior problems may have more room for improvement on the measures of externalizing behavior that serve as our outcomes than youth experiencing other kinds of difficulties. Practically, a finding like this is not intended to suggest that programs should focus solely on youth experiencing behavior problems. Rather, program personnel may have a better sense of what impacts they can expect when serving youth with academic versus behavioral difficulties, for example, knowing that impacts on externalizing behavior with youth who present with issues other than behavior problems tend to be smaller or they may consider programming with a different focus.

Exhibit 9. Core Components for Relational Approaches (k=91)

	Model 1		Model 2		Model 3	
Specific Core Components	b (se)		b (se)		b (se)	
Intercept	-0.18 (0.20)		-0.04 (0.20)		0.25 (0.09)	**
Delivery format: one-on-one	0.24 (0.14)	†	0.35 (0.15)	*		
Delivery setting: pullout	0.26 (0.14)	†	0.24 (0.15)			
Presenting problem: behavior	0.43 (0.13)	**	0.50 (0.14)	***		
Content element: Service learning	-0.14 (0.17)		-0.23 (0.17)			
Content element: Any interpersonal skills element	0.26 (0.17)		0.24 (0.17)			
General Core Components						
Implementation: Explicit or suggested problems			-0.29 (0.14)	*	-0.07 (0.15)	
Delivery complexity			-0.08 (0.09)		-0.14 (0.10)	
Provider training or supervision			-0.16 (0.14)		0.14 (0.14)	
Model Statistics						
Q-model	26.66	***	33.87	***	4.58	
Q-residual	271.66	***	257.49	***	332.03	***
τ^2	0.21		0.20		0.27	
I^2	74.70%		72.92%		79.17%	
R^2	26.22%		29.28%		3.62%	

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

Model 3 in Exhibit 9 shows the relationships between the general core components and program effects for the relational approaches; these relationships are similar to those we found for the full set of 391 programs (Exhibit 3). However, Model 2 suggests that some of the general and specific core components may be confounded in this approach category. The provider training and supervision variable is nearly redundant with the pull-out delivery setting variable (r=.50). The negative coefficient we see for provider training or supervision is thus driven primarily by the small number of programs with training or supervision that are not pullout programs (k=14). We do not interpret this finding to suggest that training and supervision are not important for classroom-based or community-based programs; rather, it is difficult to tease out the complex interrelationships among core components when particular combinations of factors are not evenly represented across the dataset.

The Q for Model 1 is statistically significant and the variables in the model account for about a quarter of the observed variability in program effects across studies. Thus, the configuration of core components for the relational approaches have potential to guide practice towards better outcomes. Although rather substantial variability remains, as suggested by the large I^2 value, the fact that features of the programs that we can identify in the research might be influential enough to effect practice is encouraging.

6.3 Core Components for Skill-building Approaches

The key features of the 121 studies of skill-building approaches are shown in Exhibit 10. Like the relational approaches, skill-building approaches are delivered across classroom, pull-out, and community settings, but the skill-building approaches tend to be shorter than the relational approaches. The one-on-one format is also less common in this category. We see teachers as delivery personnel in a number of cases. Delivery complexity is lower than the average across all of the programs, but many programs have multiple content elements.

Exhibit 10. Characteristics of Skill-building Programs (k=121)

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality			Approach Subcategory		
Explicit or suggested problems	42 (35%)	-0.33	Interpersonal + affective/executive	45	-0.09
No problems or no mention of problems	79 (65%)		Interpersonal	46	0.09
Delivery Complexity			Affective/executive	30	0.01
Number of different formats	1.4 (0.9)	-0.24	Content Elements		
Number of different provider types	1.5 (0.8)	-0.18	Relaxation skills training	14	0.03
Number of different settings	1.3 (0.8)	-0.26	Appropriate classroom behavior	12	0.04
Delivery complexity	-0.40 (0.9)	-0.26	Problem solving sequence	50	0.14
Provider Training or Supervision			Empathy	20	-0.03
Yes	69 (57%)	0.14	Attribution retraining	13	-0.00
Dosage			Moral development training	2	
Duration (weeks)	14.8 (16.1)	-0.13	Self-statements to inhibit impulsiveness or promote positive behavior	9	
Frequency (sessions/week)		0.13	Interpersonal, social skills	51	0.01
Less than weekly	9 (7%)		Conflict resolution	18	0.21
1x/week	45 (37%)		Assertive communication skills	17	0.04
1-2x/week	12 (10%)		Personal development	39	0.07
2x/week	31 (26%)		Identifying, understanding feelings	32	0.05
More than 2x/week	24 (20%)		Trusting relationship with caring adult	3	
Setting			General personal or social support	1	
In-class	36 (30%)	-0.10	Behavioral coping skills for anger/aggression	13	-0.03
Pullout	67 (55%)	0.19	Problem solving sequence for anger/aggression	32	-0.02
Community	18 (15%)	-0.11	Attribution retraining for anger/aggression	3	
Delivery Personnel			Self-statements to inhibit anger/aggression	31	0.04
Researcher	45 (38%)	-0.12	Angry behavior cycle	26	0.06
Specialist staff	23 (19%)	0.20	Parent skills training	13	-0.24
Teachers	22 (18%)	0.02	Parent functioning	1	
All others	31 (25%)		Social support	2	
Format			Family communication skills	10	-0.25
One-on-one (vs. group)	11 (9%)	0.14	Engagement with child's school	5	
Lesson Plans or Content Focused			Information provision for families	4	
Yes	83 (69%)	0.24	Academic, educational	6	

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Participant Characteristics			School structure	1	
Presenting Problem=behavior	73 (60%)	-0.01	Service learning	0	
Age	10.8 (3.1)	0.28	Self-sufficiency skills	0	
Gender mix		0.13	Health education and promotion	0	
No males (<5%)	3 (3%)		Provide basic needs	1	
Some males (<50%)	10 (8%)		Recreational	3	
50-60% male	28 (23%)		Employment, vocational	1	
Mostly males (>60%)	51 (42%)		Case management, service brokerage	1	
All males (>95%)	29 (24%)		Parenting skills for youth	0	
Predominant race/ethnicity			Unspecified	0	
White	53 (44%)	-0.02	Violence and drug use education	2	
Black	40 (33%)				
Hispanic	7 (6%)				
Other minority	2 (2%)				
Mixed, none > 60%	19 (16%)				
SES		0.13			
Low	56 (46%)				
Mid	32 (26%)				
High	33 (27%)				

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 reported only for variables or categories within categorical variables with at least 10 cases in the category.

The three meta-regression models for the skill-building approaches are shown in Exhibit 11. Four specific core components were identified. **Delivery by specialist staff was associated with larger impacts than delivery by other types of personnel. In addition, programs that were lesson-plan based were associated with better outcomes than those that were less structured.** Many skill-building approaches included multiple skills-based elements, including interpersonal skills, skills for identifying and understanding emotions, skills for managing anger or impulsiveness, and problem solving skills. Among these elements, **programs that included conflict resolution skills among their mix of elements were particularly effective. Programs that also included a family or parenting element were less effective.**

Exhibit 11. Core Components for Skill-building Approaches (k=121)

	Model 1		Model 2		Model 3	
Specific Core Components	b (se)		b (se)		b (se)	
Intercept	0.14 (0.09)		0.12 (0.10)		0.32 (0.09)	***
Delivery by specialist staff (vs. all others)	0.51 (0.12)	***	0.46 (0.12)	***		
Lesson-plan program	0.13 (0.10)		0.13 (0.10)			
Content element: Conflict resolution skills	0.26 (0.12)	*	0.29 (0.12)	*		
Content element: Any family/parenting element	-0.41 (0.14)	**	-0.11 (0.19)			
General Core Components						
Implementation: Explicit or suggested problems			-0.25 (0.10)	*	-0.30 (0.10)	**
Program complexity score			-0.09 (0.06)		-0.06 (0.05)	
Provider training or supervision			0.07 (0.09)		0.15 (0.10)	
Model Statistics						
Q-model	27.28	***	39.85	***	14.62	**
Q-residual	261.51	***	237.72	***	316.23	***
τ^2	0.13		0.11		0.16	
I^2	56.33%		52.62%		61.53%	
R^2	30.50%		36.95%		12.94%	

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

The findings shown in Models 2 and 3 in Exhibit 11 for the general core components are consistent with the findings for the general core components when tested across all programs in the dataset. The implementation problems factor is particularly important for the skill-building approaches, which may require more careful attention to fidelity than other types of approaches.

The fit statistics for Models 1 and 2 indicate that the configurations of core components identified from the research account for significant between-study differences. Comparing the τ^2 and I^2 values from the models in Exhibit 11 to the null model for skill-building approaches shown in Exhibit 4, we see that our core components substantially reduce the variability in the distribution. Practice guidelines developed from these findings, thus, have potential to result in positive changes in youth outcomes.

6.4 Core Components for Behavior Management Approaches

The key characteristics of the 27 studies of behavior management approaches are shown in Exhibit 12. Behavior management programs averaged about 23 weeks in duration, many taking place over the course of an elementary school semester about once or twice a week. The majority of behavior management programs were delivered in classroom settings and about half were administered one-on-one. In spite of the heterogeneity in the effect sizes, the relatively small number of programs in this approach category limits our ability to explore potential core components for this group of programs.

Exhibit 12. Characteristics of Behavior Management Approaches (k=27)

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality			Content Elements		
Explicit or suggested problems	12 (44%)	-0.15	Relaxation skills training	0	
No problems or no mention of problems	15 (56%)		Appropriate classroom behavior	21	0.07
Delivery Complexity			Problem solving sequence	0	
Number of different formats	1.6 (0.8)	-0.11	Empathy	0	
Number of different provider types	2.1 (1.2)	-0.10	Attribution retraining	0	
Number of different settings	1.2 (0.6)	0.09	Moral development training	0	
Delivery complexity	-0.10 (0.8)	-0.08	Self-statements to inhibit impulsiveness or promote positive behavior	5	
Provider Training or Supervision			Interpersonal, social skills	4	
Yes	20 (74%)	0.20	Conflict resolution	0	
Dosage			Assertive communication skills	0	
Duration (weeks)	23.3 (32.5)	-0.19	Personal development	6	
Frequency (sessions per week)		-0.07	Identifying, understanding feelings	0	
Less than weekly	9 (7%)		Trusting relationship with caring adult	0	
1x/week	45 (37%)		General personal or social support	1	
1-2x/week	12 (10%)		Behavioral coping skills for anger/aggression	0	
2x/week	31 (26%)		Problem solving sequence for anger/aggression	0	
More than 2x/week	24 (20%)		Attribution retraining for anger/aggression	0	
Setting			Self-statements to inhibit anger/aggression	1	
In-class	19 (70%)	-0.17	Angry behavior cycle	0	
Pullout	4 (15%)		Parent skills training	5	
Community	4 (15%)		Parent functioning	0	
Delivery Personnel			Social support, building support network	0	
Researcher	2 (7%)		Family communication skills	0	
Specialist staff	6 (22%)		Engagement with child's school	0	
Teachers	11 (41%)	-0.04	Information provision for families	0	
All others	8 (30%)		Academic, educational	8	
Format			School structure	0	
One-on-one (vs. group)	14 (52%)	0.33	Service learning	0	
			Self-sufficiency skills	0	
Yes	1 (4%)		Health education and promotion	0	

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Participant Characteristics			Provide basic needs	0	
Presenting Problem=behavior	11 (41%)	0.21	Recreational	1	
Age	9.9 (3.0)	0.01	Employment, vocational	0	
Gender mix		0.11	Case management, service brokerage	0	
No males (<5%)	1 (4%)		Parenting skills for youth	0	
Some males (<50%)	3 (11%)		Unspecified	0	
50-60% male	3 (11%)		Violence and drug use education	0	
Mostly males (>60%)	18 (67%)				
All males (>95%)	2 (7%)				
Predominant race/ethnicity					
White	10 (37%)	-0.06			
Black	10 (37%)				
Hispanic	2 (7%)				
Other minority	1 (4%)				
Mixed, none > 60%	4 (15%)				
SES		0.13			
Low	15 (56%)				
Mid	7 (26%)				
High	5 (19%)				

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 reported only for variables or categories within categorical variables with at least 10 cases in the category.

The core components meta-regression analysis for behavior management approaches shown in Exhibit 13 indicates that **one-on-one formatted programs performed better than programs delivered in group settings**. Behavior management approaches are often tailored to individual youth participants so it is not surprising that the one-on-one format is more effective than the other formats. The findings from Models 2 and 3, although not universally consistent with the overall analysis, do not call into question the importance of our general core components. Behavior management approaches exhibited lower than average delivery complexity, which may explain the small coefficient for this variable in Models 2 and 3.

Exhibit 13. Core Components for Behavior Management Approaches (k=27)

	Model 1	Model 2	Model 3
Specific Core Components	b (se)	b (se)	b (se)
Intercept	0.46 (0.13) ***	0.40 (0.27)	0.49 (0.25) †
One-on-one format	0.31 (0.22)	0.29 (0.28)	
General Core Components			
Implementation: Explicit or suggested problems		-0.02 (0.27)	-0.16 (0.23)
Program complexity score		0.05 (0.16)	0.00 (0.16)
Provider training or supervision		0.12 (0.31)	0.21 (0.29)
Model Statistics			
Q-model	2.06	1.94	0.86
Q-residual	66.14 ***	62.19 ***	67.00 ***
τ^2	0.17	0.21	0.27
I^2	64.12%	66.66%	90.45%
R^2	9.71%	0.00%	6.00%

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

Overall, the models for the behavior management approaches do not account for significant between-study variability. Other than one-on-one format, no other specific core component we identified in the source studies explained a meaningful degree of between-study differences, leaving rather substantial unexplained variability for such a small group of programs. Practice guidelines derived from these findings may have less potential to influence youth outcomes than those derived from models that more reliably account for observed differences between studies. However, the large mean effect size for this approach category ($\bar{g}$ = 0.58, p < .0001) indicates that behavior management approaches can produce meaningful changes in behavior. The difficulty is more that it is not clear how to improve on behavior management approaches, other than considering individualized or one-on-one delivery.

6.5 Core Components for Academic and Educational Approaches

The characteristics of the final group of programs, the academic and educational approaches, are shown in Exhibit 14. The programs in this group differ from the other four groups in several ways. Academic and educational approaches are considerably longer than the other approaches and services are provided more frequently. Many of the school structure programs, for example, operate five days a week. As expected, many programs are delivered in class settings by teachers. Youth participants are older than for the other programs. Most programs in this approach group are focused on youth with academic difficulties rather than youth with behavior problems, though behavior problems are clearly a concern for these interventions as evidenced by the inclusion of externalizing outcome measures in the studies.

Exhibit 14. Characteristics of Academic and Educational Approaches (k=75)

	Frequency (%) Mean (sd)	Correlation with Effect Size		Frequency	Correlation with Effect Size
Implementation Quality			Approach Subcategory		
Explicit or suggested problems	43 (57%)	-0.00	School structure	21	0.05
No problems or no mention of problems	32 (43%)		Tutoring academic supports	37	-0.02
Delivery Complexity			Career, vocational focus	17	-0.03
Number of different formats	2.6 (1.3)	-0.16	Content Elements		
Number of different provider types	2.2 (1.1)	-0.13	Relaxation skills training	1	
Number of different settings	1.8 (0.9)	-0.18	Appropriate classroom behavior	11	0.17
Delivery complexity	0.7 (1.2)	-0.20	Problem solving sequence	2	
Provider Supervision or Training			Empathy	0	
Yes	42 (56%)	-0.03	Attribution retraining	2	
Dosage			Moral development training	0	
Duration (weeks)	37.2 (27.5)	-0.10	Self-statements to inhibit impulsiveness or promote positive behavior	1	
Frequency (sessions per week)		0.04	Interpersonal, social skills	13	0.12
Less than weekly	8 (11%)		Conflict resolution	7	
1x/week	4 (5%)		Assertive communication skills	2	
2-4x/week	13 (17%)		Personal development	38	0.002
More than 2x/week	50 (67%)		Identifying, understanding feelings	2	
Setting			Trusting relationship with caring adult	12	-0.12
In-class	51 (68%)	0.07	General personal or social support	18	-0.20
Pullout	7 (9%)		Behavioral coping skills for anger/aggression	0	
Community	17 (23%)		Problem solving sequence for anger/aggression	0	
Delivery Personnel			Attribution retraining for anger/aggression	0	
Researcher	6 (8%)		Self-statements to inhibit anger/aggression	0	
Specialist staff	10 (13%)		Angry behavior cycle	1	
Teachers	44 (59%)	0.14	Parent skills training	6	
All others	15 (20%)		Parent functioning	2	
Lesson Plans or Content Focused			Social support	1	
Lesson plans	4 (5%)		Family communication skills	2	
Content focused	20 (27%)		Engagement with child's school	26	-0.21
Structural	31 (41%)	0.02	Information provision for families	3	
Combination	20 (27%)		Academic, educational	57	0.08

	Frequency (%) Mean (sd)	Correlation with Effect Size
Participant Characteristics		
Presenting Problem=behavior	7 (9%)	
Age	13.4 (3.4)	-0.05
Gender mix		-0.10
No males (<5%)	1 (1%)	
Some males (<50%)	12 (16%)	
50-60% male	26 (35%)	
Mostly males (>60%)	28 (37%)	
All males (>95%)	8 (11%)	
Predominant race/ethnicity		
White	22 (29%)	-0.04
Black	29 (39%)	
Hispanic	8 (11%)	
Other minority		
Mixed, none > 60%	16 (21%)	
SES		-0.03
Low	45 (60%)	
Mid	21 (28%)	
High	9 (12%)	

	Frequency	Correlation with Effect Size
School structure	20	0.01
Service learning	8	
Self-sufficiency skills	2	
Health education and promotion	5	
Provide basic needs	2	
Recreational	17	-0.05
Employment, vocational	27	0.05
Case management, service brokerage	17	-0.06
Parenting skills for youth	1	
Unspecified	3	
Violence and drug use education	3	

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 reported only for variables or categories within categorical variables with at least 10 cases in the category.

Exhibit 15 presents the results of the core components meta-regression analysis for the academic and educational approaches. Unlike the other approaches, delivery personnel, setting, and format were not associated with more or less effective programs in this category. For the academic and educational approaches, different types of content were associated with program impacts on externalizing behavior problems. Among the approach subcategories, **programs focused on school structure were associated with more positive outcomes than programs focused on tutoring and academic supports or career and vocational topics. In addition, programs with an appropriate classroom behavior element exhibited more positive outcomes than programs that did not incorporate this element.** Programs with appropriate classrooms behavior elements included content on teaching the youth participants classroom rules, when it is appropriate to raise your hand, to take turns speaking, to pay attention to instructors, and how to contribute to an orderly classroom environment (i.e., not creating distractions). It is not surprising that academically-focused programs with an added behavior element might have stronger influences on externalizing behaviors than those without such elements. **Programs with more of a mentoring (trusting relationship with caring adult) or general personal or social support focus were generally less effective for reducing behavior problems that programs without these elements**.

Exhibit 15. Core Components for Academic and Educational Approaches (k=75)

	Model 1	Model 2	Model 3
Specific Core Components	b (se)	b (se)	b (se)
Intercept	0.21 (0.09) *	0.30 (0.12) **	0.32 (0.11) **
Subcategory: School structure (vs. tutoring and vocational approaches)	0.18 (0.16)	0.22 (0.16)	
Content element: Appropriate classroom behavior	0.25 (0.19)	0.21 (0.19)	
Content element: Trusting relationship w/ caring adult	-0.15 (0.18)	-0.08 (0.18)	
Content element: General personal or social support	-0.32 (0.17) †	-0.32 (0.18) †	
General Core Components			
Implementation: Explicit or suggested problems		-0.30 (0.16) †	-0.25 (0.16)
Delivery complexity		-0.08 (0.06)	-0.13 (0.06) *
Provider training or supervision		0.03 (0.14)	0.05 (0.14)
Model Statistics			
Q-model	8.13 †	12.83 †	6.71 †
Q-residual	644.19 ***	617.37 ***	659.78 ***
τ^2	0.27	0.27	0.28
I^2	90.57%	90.17%	90.69%
R^2	5.60%	6.93%	4.00%

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

Models 2 and 3 show the findings for the general core components for the academic and educational approaches. The relationships of these general factors to the outcomes parallel the overall findings for the general factors. Academically focused programs are generally longer and more complex than average. Implementation may be particularly important for these types of programs to achieve the expected outcomes.

The overall model fit for the academic-educational approaches is moderate. The Q-model statistics and proportion of variance accounted for by the models indicate that there may be other, unknown factors associated with positive program effects in addition to the program characteristics identified in our models. Although the models provide some clues to factors that are meaningfully associated with more effective programs (e.g., appropriate classroom behavior elements, implementation quality), the variability unaccounted for by the models could be predictable from characteristics that are unknown or unreported in the research and these unknown factors could overshadow those we identified here.

7 Conclusions

Overall, our analysis identified a range of actionable core components in the research on youth programs. Across all programs, three general core components were observed:

- Implementation quality: Explicit mention or suggestion of implementation problems was associated with smaller program impacts.
- Delivery complexity: Programs delivered with multiple formats (e.g., with both group and individual components), in multiple settings (e.g., during and after school), and/or that employed multiple different types of personnel (e.g., teachers and social workers) tended to have smaller program impacts.
- Provider training or supervision: Explicit mention of provider training or supervision was associated with larger program impacts

In addition, across the five approaches to behavior change, a number of specific core components were identified, as summarized in Exhibit 16.

Exhibit 16. Summary of Analysis of Specific Core Components

	Program Content	Program Structure	Participant Characteristics	Overall Model Fit
Family Relations and Parenting Skills	Programs that included family communication skills or personal development elements exhibited larger program impacts.	One-on-one formatted programs and those with lesson plans exhibited larger program impacts.	Programs with younger children exhibited larger program impacts.	Weak
Relational Approaches	Programs that included interpersonal skills elements exhibited larger program impacts. Programs that included service learning elements tended to have smaller program impacts.	One-on-one formatted programs and those based in schools with pullout formats evidenced larger program impacts.	Programs serving youth with behavior problems exhibited larger program impacts.	Strong
Skill-Building	Programs that included conflict resolution skills elements exhibited larger program impacts. Programs that included any family/parenting element exhibited smaller program impacts.	Programs that had lesson-plans and used specialist delivery personnel exhibited larger program impacts.		Strong
Behavior Management		One-on-one formatted programs exhibited larger program impacts.		Weak
Academic-Educational	Programs that focused on changing the school environment or structure exhibited larger program impacts than those focused primarily on academic or vocational content. Programs that included appropriate classroom behavior elements exhibited larger program impacts. Programs that included trusting relationship or general personal support elements exhibited smaller program impacts.			Moderate

The general core components and the specific core components for relational approaches and skill-building approaches explain meaningful differences in program impacts and, thus, have the strongest potential to inform practice guidelines. For academic-educational approaches, the core components we identified resulted in an overall model with a moderate fit to the data. For academic-educational approaches, then, the corresponding practice guidelines may have less potential influence on youth outcomes because other factors not present in our dataset may also be associated with effective

programs. In contrast, the models for family relations and parenting skills approaches and behavior management approaches, though they point 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. 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 weak model fits that we observe for family relations and parenting skills approaches and behavior management approaches means that we are less confident about the practices we might recommend that could improve outcomes for service providers implementing such approaches. However, these two approach categories had the largest average impacts on youth behavior outcomes across all the approach categories. Thus, just because the model results suggest that there may be other factors that are more predictive of larger impacts than the core components we identified for these approaches, both approaches have good potential to improve youth outcomes. This is particularly true for the behavior management approaches, which because of their relatively low delivery complexity, may be recommended as a stand-alone strategy.

The findings and the meta-regression analyses we use to produce them are correlational and it would be incorrect to draw causal conclusions from this work. 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 former 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 RCTs 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 externalizing problem behavior.

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 most 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=391)

	Frequency (%) Mean (sd)		Frequency
Program Dosage		Content Elements	
Duration (weeks)	22.76 (22.64)	Relaxation skills training	17
Frequency (sessions per week)		Appropriate classroom behavior	59
Less than weekly	34 (9%)	Problem solving sequence	69
1x/week	130 (33%	Empathy	21
1-2x/week	21 (5%)	Attribution retraining	32
2x/week	79 (20%)	Moral development training	2
2-3x/week	11 (3%)	Self-statements to inhibit impulsiveness or promote positive behavior	19
3x/week	8 (2%)	Interpersonal, social skills	137
3-4x/week	9 (2%)	Conflict resolution	30
4x/week	10 (3%)	Assertive communication skills	23
Daily (5x/week)	89 (23%)	Personal development	168
Program Complexity		Identifying, understanding feelings	53
Number of Different Formats	1.8 (1.1)	Trusting relationship with caring adult	34
Number of Different Provider Types	1.7 (1.0)	General personal or social support	33
Number of Different Settings	1.5 (0.9)	Behavioral coping skills for anger/aggression	15
Program Setting		Problem solving sequence – anger	38
In-class	144 (37%)	Attribution retraining for anger/aggression	3
School, pull-out	121 (31%)	Self-statements to inhibit anger/aggression	32
Community	126 (32%)	Angry behavior cycle	31
Delivery Personnel		Parent skills training	84
Researcher	94 (24%)	Parent functioning	21
Specialist staff	88 (23%)	Social support, building support network	13
Teachers	79 (20%)	Family communication skills	54
Laypersons, paraprofessionals	43 (11%)	Engagement with child's school	43
All others	87 (22%)	Information provision for families	18
Implementation Problems		Academic, educational	99
Explicit or suggested problems	152 (39%)	School structure	21
No problems or none mentioned	239 (61%)	Service learning	33
Provider Training or Supervision		Self-sufficiency skills	2
Neither training or supervision	163 (42%)	Health education and promotion	8
Either training or supervision	228 (58%)	Provide basic needs	7
		Recreational	40
		Employment, vocational	32
		Case management, service brokerage	30
		Parenting skills for youth	24
		Unspecified content	5
		Violence and drug use education	17

Appendix B. Analytic Methods

This paper focuses on the externalizing behavior outcomes in the larger database. These outcomes were recorded from the research studies as standardized mean difference effect size statistics (*d*) calculated as the post-intervention differences in externalizing outcomes between the intervention and control groups, divided by the pooled standard deviation of the groups. Cox transformations were applied to effect sizes based on dichotomous outcomes as outlined by Sánchez-Meca and colleagues (2003). 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.

Effect Size Selection and Aggregation

One effect size estimate was used in the analyses for each study. Studies often reported multiple effect sizes in the externalizing behavior domain. These multiples came in several forms. In some cases, studies reported effect sizes for more than one type of externalizing behavior (aggression, acting out, school disciplinaries). In other cases, studies reported the same type of externalizing behavior outcome but from different informants (e.g., parents, teachers, etc.). The multiple effect sizes differed enough within study that averaging or selecting one would be likely to produce different overall results. We, therefore, organized the effect sizes from studies with multiple effect sizes into conceptually and empirically similar groups by type of externalizing behavior and informant. For example, effect sizes recorded as externalizing behavior, problem behavior, aggressive behavior, verbal aggression, disruptive behavior, and the like showed little empirical differentiation and were conceptually similar. The school disciplinary and conduct categories were more distinct from the above cluster of externalizing behavior types. There were fewer within-study multiples in this group of effect sizes so we have limited information about their empirical similarity; these were, thus, grouped on conceptual grounds. Among the informants, there was little empirical differentiation among informant categories of subject self-reports, parent reports, teacher reports, school records, peer reports, and researcher/interviewer reports. All of these informants were grouped together based on their empirical similarity. Observations were the only informant source that showed some empirical distinction, though data were limited for this assessment.

With the objective of using as many of the effect sizes as possible, once these conceptual/empirical groupings were created, we aggregated the effect sizes within these groups. When effect sizes from more than one of these conceptual/empirical groups were available within a study, we selected the aggregate from the most common externalizing behavior type and informant type. Indicators for these aggregations and selections were tested in the methods analysis 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 'Amelia' package (Honaker et al., 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 variables with fewer categories. 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 the three potential core components that were ordinal (program frequency, gender mix, and SES). Two potential core components were scaled continuously, program duration and average age of the sample. For these variables, if a 10 week change on duration or 3 year change on age was associated with +/- .10 in the effect size, the variable was considered meaningful. These values represent approximately half of a standard deviation for each variable.

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 with an eigen value of 1.8 and which explained 60% of the variance. Factor loadings for settings, personnel, and formats were .79, .63, and .88, respectively.

Data Analysis

All 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 component (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 aren't 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=391)

	Frequency (%)	Mean (sd)	Range	Correlation with Effect Size
Research Design				
Individual random assignment	200 (51%)			0.07
Cluster random assignment	38 (10%)			
Quasi-experimental design	153 (39%)			
Features of Average Effect				
Total sample size (Winsorized)		78 (90)	16-491	-0.20
N of Effect Sizes Aggregated		2.1 (1.7)	1-11	0.08
N of Effect Sizes in Aggregate Adjusted for Pretest		1.6 (1.8)	0-11	0.13
N of Effect Sizes in Aggregate Derived from Binary Data		0.2 (0.5)	0-4	-0.13
Type of Externalizing Behavior Measured				
Externalizing	306 (78%)			0.22
School disciplinaries, suspensions	85 (22%)			
Comparison Group Level of Service				
No service	75 (19%)			0.06
Usual service	261 (67%)			
Minimal service	55 (14%)			

We estimated two models that included methods variables for the full sample of 391 programs. The first includes only the method variables and the second includes the method variables plus the universal core components. These results are shown in Exhibit C2. Using our threshold of .10 effect size units, we see that several method characteristics are associated with effect sizes. Studies in which comparison group participants received less service (i.e., the contrast between the amount of services received by the intervention and comparison group participants was larger) exhibited larger impacts, as would be expected. In addition, the type of externalizing behavior was also associated with effect sizes, with externalizing behavior measures producing larger effect sizes than measures of school disciplinaries or suspensions. Although the method variables account for a significant portion of effect size variability, Model 2 indicates that the relationships of the universal core components to effect sizes are consistent with the overall model even when methodological variables are taken into account.

Exhibit C2. Method Variables Analysis for All Programs (k=391)

	Model 1			Model 2		
Method Variables	b	se		b	se	
Intercept	- 0.18	0.15		-0.14	0.14	
Design: Individual random assignment	0.003	0.06		0.01	0.06	
Comparison group level of service (higher scores=less service)	0.16	0.06	**	0.15	0.05	**
Intervention and comparison group same context	0.04	0.06		0.03	0.06	
Type of externalizing behavior: externalizing	0.27	0.08	***	0.19	0.08	*
N of Effect Sizes Aggregated	-0.01	0.03		0.03	0.03	
N of Effect Sizes in Aggregate Adjusted for Pretest	0.002	0.03		-0.03	0.03	
N of Effect Sizes in Aggregate Derived from Binary Data	-0.07	0.06		-0.07	0.06	
General Core Components						
Implementation: Explicit or suggested problems				-0.12	0.06	*
Delivery complexity				-0.10	0.03	**
Provider training or supervision				0.06	0.06	
Model Statistics						
Q-model	27.07	***		46.56	***	
Q-residual	2341.91	***		2186.66	***	
τ^2	.25			.23		
I^2	81.84%			80.79%		
R^2	5.86%			11.12%		

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 present a series of regression models in which we explore the method variables for each program approach category. 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. In each exhibit, Model 1 shows the method variables alone. Model 2 adds the specific core components for each approach. With the exception of the family relations and parenting skills approaches, 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. 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. For the family relations and parenting skills approaches, the method variables appear to be confounded with the specific core components, which does suggest that our core components may have less potential to influence youth outcomes than those for the other approaches. More work on these approaches to identify factors that do predict positive outcomes is suggested.

Exhibit C3. Method Variables Analysis for Family Relations and Parenting Skills Approaches (k=64)

	Model 1		Model 2	
Method Variables	b	se	b	se
Intercept	0.32	0.38	0.44	0.50
Design: Individual random assignment	-0.12	0.16	-0.14	0.16
Comparison group level of service (higher scores=less service)	0.14	0.11	0.17	0.12
Intervention and comparison group same context	-0.13	0.15	-0.11	0.15
Type of externalizing behavior: externalizing	-0.15	0.31	-0.27	0.32
N of Effect Sizes Aggregated	0.02	0.06	0.03	0.07
N of Effect Sizes in Aggregate Adjusted for Pretest	0.03	0.06	0.01	0.07
N of Effect Sizes in Aggregate Derived from Binary Data	0.33	0.52	0.35	0.54
Specific Core Components				
Delivery format: one-on-one			0.07	0.18
Lesson-plan-based program			0.07	0.18
Age of sample			0.25	0.18
Content element: Family communication skills			0.15	0.15
Content element: Personal development			-0.03	0.02
Model Statistics				
Q-model	5.76		10.29	
Q-residual	349.04	***	250.34	***
τ^2	.20		.19	
I^2	77.65%		75.65%	
R^2	0.00%		0.00%	

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

Exhibit C4. Method Variables Analysis for Relational Approaches (k=91)

	Model 1			Model 2		
Method Variables	b	se		b	se	
Intercept	0.26	0.37		-0.25	0.57	
Design: Individual random assignment	-0.01	0.14		0.00	0.14	
Comparison group level of service (higher scores=less service)	0.08	0.15		0.15	0.17	
Intervention and comparison group same context	-0.06	0.15		-0.01	0.16	
Type of externalizing behavior: externalizing	0.35	0.15	*	0.22	0.17	
N of Effect Sizes Aggregated	-0.13	0.07		-0.16	0.08	*
N of Effect Sizes in Aggregate Adjusted for Pretest	0.03	0.07		0.06	0.08	
N of Effect Sizes in Aggregate Derived from Binary Data	-0.32	0.13	*	-0.11	0.16	
Specific Core Components						
Delivery format: one-on-one				0.22	0.16	
Delivery setting: pullout				0.18	0.17	
Presenting problem: behavior				0.43	0.14	**
Content element: Service learning				-0.04	0.24	
Content element: Any interpersonal skills element				0.14	0.20	
Model Statistics						
Q-model	22.59	**		36.57	***	
Q-residual	278.85	***		240.73	***	
τ^2	.23			.20		
I^2	75.30%			72.68%		
R^2	20.05%			27.66%		

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

Exhibit C5. Method Variables Analysis for Skill-building Approaches (k=121)

	Model 1			Model 2		
Method Variables	b	se		b	se	
Intercept	0.07	0.30		-0.34	0.27	
Design: Individual random assignment	0.11	0.11		0.15	0.10	
Comparison group level of service (higher scores=less service)	0.24	0.10	*	0.29	0.09	**
Intervention and comparison group same context	0.04	0.12		0.13	0.11	
Type of externalizing behavior: externalizing	-0.23	0.22		-0.24	0.19	
N of Effect Sizes Aggregated	-0.05	0.06		0.02	0.06	
N of Effect Sizes in Aggregate Adjusted for Pretest	0.03	0.07		-0.03	0.06	
N of Effect Sizes in Aggregate Derived from Binary Data	0.14	0.11		0.12	0.10	
Specific Core Components						
Delivery by specialist staff (vs. all others)				0.54	0.12	***
Lesson-plan program				0.19	0.10	*
Content element: Conflict resolution skills				0.20	0.12	
Content element: Any family/parenting element				-0.48	0.14	***
Model Statistics						
Q-model	10.51			47.19	***	
Q-residual	330.31	***		216.23	***	
τ^2	.17			.10		
I^2	63.34%			49.50%		
R^2	4.64%			43.13%		

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

Exhibit C6. Method Variables Analysis for Behavior Management Approaches (k=27)

	Model 1		Model 2	
Method Variables	b	se	b	se
Intercept	0.67	0.94	0.94	1.00
Design: Individual random assignment	-0.21	0.26	-0.25	0.27
Comparison group level of service (higher scores=less service)	-0.19	0.38	-0.27	0.39
Intervention and comparison group same context	0.42	0.27	0.34	0.29
Type of externalizing behavior: externalizing	0.24	0.33	0.12	0.36
N of Effect Sizes Aggregated	0.11	0.43	0.03	0.44
N of Effect Sizes in Aggregate Adjusted for Pretest	-0.12	0.42	-0.04	0.43
N of Effect Sizes in Aggregate Derived from Binary Data	-0.40	0.47	-0.39	0.47
Specific Core Components				
One-on-one format			0.24	0.29
Model Statistics				
Q-model	4.78		5.44	
Q-residual	55.57	***	52.67	***
τ^2	.21		.21	
I^2	67.74%		67.72%	
R^2	0.00%		0.00%	

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

Exhibit C7. Method Variables Analysis for Academic and Educational Approaches (k=75)

	Model 1			Model 2	
Method Variables	b	se		b	se
Intercept	-0.30	0.46		-0.45	0.50
Design: Individual random assignment	-0.06	0.17		0.01	0.18
Comparison group level of service (higher scores=less service)	0.15	0.17		0.22	0.17
Intervention and comparison group same context	0.16	0.17		0.14	0.17
Type of externalizing behavior: externalizing	0.28	0.16	†	0.25	0.17
N of Effect Sizes Aggregated	0.04	0.12		0.06	0.12
N of Effect Sizes in Aggregate Adjusted for Pretest	-0.05	0.12		-0.05	0.12
N of Effect Sizes in Aggregate Derived from Binary Data	-0.06	0.12		-0.02	0.13
Specific Core Components					
Subcategory: School structure (vs. tutoring and vocational approaches)				0.18	0.18
Content element: Appropriate classroom behavior				0.22	0.21
Content element: Trusting relationship w/ caring adult				-0.23	0.21
Content element: General personal or social support				-0.32	0.18
Model Statistics					
Q-model	4.62			12.63	
Q-residual	659.47	***		585.35	***
τ^2	.31			.29	
I^2	91.24%			90.48%	
R^2	0.00%			0.64%	

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

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References for the Studies in the Meta-Analysis

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.

Study ID	Reference
50005	Abbott, D. A., Meredith, W. H., Self-Kelly, R., & Davis, M. E. (1997). The influence of a Big Brothers program on the adjustment of boys in single-parent families. *Journal of Psychology, 131*(2), 143-156.
50008	Aberson, B., Albury, C., Gutting, S., Mann, F., & Trushin, B. (1987). *I Can Problem Solve (ICPS): A cognitive training program for kindergarten children* (Report to the Bureau of Education). Dade County, Florida: Dade County Public Schools.
50010	Adams, C. D., & Kelley, M. L. (1992). Managing sibling aggression: Overcorrection as an alternative to time-out. *Behavior Therapy, 23*, 707-717.
50011	Adams, J. R. K. (2003). The effectiveness of multifaceted treatment for delinquent and ungovernable adolescents: A long-term follow-up study of recidivism (Doctoral dissertation). Available from ProQuest Dissertations and Theses.
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50020	Agodini, R., & Dynarski, M. (2001). *Are experiments the only option? A look at dropout prevention programs.* Princeton, NJ: Mathematica Policy Research, Inc.
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Study ID	Reference
	Stuart, E. A. (2004). *Matching methods for estimating causal effects using multiple control groups.* (Unpublished master's thesis). Harvard University, Cambridge, MA.
	What Works Clearinghouse (2009). *Middle College High School*. Washington, DC: Institute of Education Sciences, U. S. Department of Education.
	What Works Clearinghouse. (2007). *Twelve Together*. Washington, DC: Institute of Education Sciences, U. S. Department of Education.
	What Works Clearinghouse. (2008). *Accelerated Middle Schools*. Washington, DC: Institute of Education Sciences, U. S. Department of Education.
50021	Agopian, M. W. (1991). *Los Angeles County Gang Alternative Prevention Program: Evaluation Report.* Rockville, MD: National Institute of Justice. (NCJRS Document Reproduction Service No. 149343)
50026	Allen, G. J., Chinsky, J. M., Larcen, S. W., Lochman, J. E., & Selinger, H. V. (1976). Building constructive teacher-child relationships. In Allen, G. J., Chinsky, J. M., Larcen, S. W., Lochman, J. E., & Selinger, H. V. (Eds.), *Community psychology and the schools: A behaviorally oriented multilevel prevention approach* (1st ed.) (pp. 148-165). Hillsdale, NY: Lawrence Erlbaum.
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