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Moderators of Psychosocial Intervention Response for Children and Adolescents with Conduct Problems

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ABSTRACT

Objective: The purpose of this Brief Report is to synthesize the current evidence base examining moderators of psychosocial intervention response for children and adolescents with conduct problems (CP). We also provide directions for future research.

Method: We focused on four categories of psychosocial interventions for the prevention and/or treatment of CP: (1) parent management training (PMT) for children, (2) other family-based interventions for adolescents, (3) youth skills training, and (4) multicomponent interventions (i.e., family-based intervention plus skills training). Emphasis is placed on findings from meta-analyses.

Results: Moderation analyses have occurred more frequently for PMT than for other types of interventions. Variables for which there was consistent evidence for positive moderation included higher initial severity of CP, father engagement, higher maternal depressive symptoms, individual administration (vs. group), and treatment/targeted prevention approaches (vs. universal prevention). Variables where there was evidence for no moderation (demonstrating generalizability) included child diagnostic status and family risk in PMT, and diagnostic status and intervention setting for skills training. However, for some variables, evidence of moderation was dependent on intervention type.

Conclusions: Future research should examine multiple moderators in combination; incorporate innovative techniques such as integrative data analyses, individual participant data, and class-based modeling, which may identify moderator effects that are undetected by more traditional variable-oriented moderation analyses; and conduct moderated mediation models for informing developmental theory on the interplay of risk and protective factors.

Conduct problems (CP) in children and adolescents encompass a broad range of “acting-out” behaviors, from relatively minor oppositional behaviors, such as yelling and temper tantrums, to more serious forms of antisocial behavior, including aggression, physical destructiveness, and stealing (McMahon & Frick, 2019). The DSM-5 (American Psychiatric Association, 2013) specifies two diagnostic categories pertaining to youth CP: oppositional defiant disorder (ODD) and conduct disorder (CD). Many children with significant CP will experience chronic antisocial difficulties (e.g., arrests, risky sexual behavior) and other mental health problems (e.g., substance abuse, depression) that persist into adolescence and adulthood; thus, the associated lifetime social and economic costs are enormous (McMahon & Frick, 2019).

There is substantial evidence for the efficacy and effectiveness of various preventive- and treatment-focused psychosocial interventions for CP (Kaminski & Claussen, 2017; McCart & Sheidow, 2016; McMahon &

Frick, 2019). There is also a growing body of evidence testing whether certain characteristics may *moderate* these effects. Moderators are present prior to intervention and influence the strength or direction of the relationship between intervention and outcome and may inform for whom, or under what conditions, an intervention is effective (Kraemer et al., 2002).

The purpose of this Brief Report is to synthesize the current evidence base examining moderators of psychosocial interventions for CP and to provide directions for future research. We focus on four broad categories of interventions: (1) parent management training (PMT) for children, (2) other family-based interventions for adolescents, (3) youth skills training (e.g., cognitive-behavioral therapy [CBT] approaches such as social skills, moral reasoning, social information processing, and problem-solving skills training), and (4) multicomponent interventions, which typically include family-based intervention and skills training. Family-based interventions for CP have the strongest empirical support. For example,

all of the Level 1 (Well-Established) interventions for children (Kaminski & Claussen, 2017) and adolescents (McCart & Sheidow, 2016) are family-based interventions, as are many of the Level 2 (Probably Efficacious) interventions. However, the effectiveness of these family-based interventions may be increased by adding other intervention components related to individual skills as the child approaches adolescence, likely reflective of the increased influence of environments outside of the home on youth behavior. Because of the sheer volume of intervention outcome research with CP, we focus on meta-analytic reviews; systematic reviews and individual studies are occasionally cited as exemplars. We include both aggregate-level meta-analyses (i.e., testing between trials) and individual participant data meta-analyses, which present an advantage over the former in the ability to test both between- and within-trial effects (Brown et al., 2013). Investigation of moderator effects is limited to the primary outcome of child CP, broadly defined, at post-intervention. Table 1 provides a summary of the meta-analytic studies included in this Brief Report.

Moderators of intervention response: What we know

In this section, we examine the evidence for moderation of interventions for youth CP in the following domains: child characteristics, parent characteristics, broader sociodemographic characteristics, and intervention characteristics.

Child characteristics

Child characteristics that potentially moderate the effects of intervention include initial level of CP severity, diagnostic status, comorbidity, age, sex/gender, and race/ethnicity.¹ Several meta-analyses have demonstrated that greater *initial severity of CP* is associated with greater benefit from PMT interventions (e.g., Leijten et al., 2020; Lundahl et al., 2006; Menting et al., 2013). Similar findings have also been established with multicomponent interventions. For example, for the highest-risk group (i.e., at kindergarten), there were 75% fewer CD diagnoses in grade 9 among Fast Track intervention youth compared to youth in the control group, whereas there was no difference in CD diagnoses

for intervention and control youth at moderate initial risk (Conduct Problems Prevention Research Group [CPPRG], 2007). However, initial severity of CP did not moderate the effects of child-focused CBT interventions for anger-related problems (Sukhodolsky et al., 2004).

Although severity of CP has consistently proven to be a moderator of intervention, *diagnostic status* and *comorbidity* of the child have not. A small meta-analysis of Parent–Child Interaction Therapy (PCIT) reported no moderation of intervention effects by diagnosis (ODD, CD, attention-deficit/hyperactivity disorder [ADHD]) (Ward et al., 2016). Others have failed to find comorbid ADHD to moderate PMT effects for the Incredible Years (IY) PMT intervention (e.g., Leijten, Raaijmakers et al., 2018; Leijten et al., 2020), although the former meta-analysis (four trials) found that children with comorbid emotional problems had more positive outcomes, whereas the latter meta-analysis (13 trials) did not. Diagnosis (ODD, CD) did not moderate the effects of CBT skills training interventions (Smeets et al., 2015).

Findings regarding child *age* as a potential moderator of intervention have been somewhat mixed, with most meta-analyses finding age not to be a moderator across the intervention spectrum (e.g., Florean et al., 2020; Lösel & Beelmann, 2003; Lundahl et al., 2006; Smeets et al., 2015; Sukhodolsky et al., 2004; van Stam et al., 2014). The most compelling evidence for the generalization of intervention effects across child age comes from recent meta-analyses of IY and of a broader range of PMT programs (Gardner, Leijten, Melendez-Torres et al., 2019). Conversely, other meta-analyses reported that skills training interventions employing CBT approaches are more effective for adolescents than for younger children (age range 5–18 years) (McCart et al., 2006), and Multisystemic Therapy (MST; a multicomponent intervention) is more effective for adolescents less than 15 years old (van der Stouwe et al., 2014).

The effectiveness of family-based interventions (including PMT) appears to be comparable for *boys and girls* (e.g., Florean et al., 2020; Kaminski & Claussen, 2017; Leve et al., 2015; McCart & Sheidow, 2016). For example, a meta-analysis of PCIT outcomes reported no moderation of intervention effect by child gender (Ward et al., 2016). Findings with other

¹Because conventions for defining race, ethnicity (as well as “cultural diversity” and “minority status”) have evolved over the period in which the studies included in the meta-analyses were conducted, there is likely variability in how these terms were defined, not only across individual studies but in the meta-analyses as well. Further complicating the issue is that many of the meta-analyses were conducted with European samples, which included both European White/Caucasian groups and ethnic groups from other parts of the world that are regarded as ethnic minorities in those particular European countries. We have elected to employ the terminology used by the study authors to describe their samples, recognizing that this may not accurately capture this aspect of sample composition using current conceptualizations of these constructs. We have adopted a similar approach to the use of “sex” and “gender.”

Table 1. Summary of meta-analyses on the moderation of child and adolescent conduct problems.

Study	Sample	Inclusion criteria	Moderation results
Floorean et al. (2020)	$k = 15$; $N = 1,668$; age = 2–18 years; 2012–2019.	Randomized trials of online PMT programs targeting behavior problems with children under 18 years.	The number of protocol sessions and percentage of parents with a university degree positively predicted better child outcomes. No evidence that child age, sex, dropout percentage, risk of bias, or percentage of parents that completed all sessions moderated the effect of online PMT programs.
Gardner, Leijten, Harris et al. (2019)	$k = 13$; $N = 1,696$; age = 2–10 years; 63.5% male; 30% ethnic minority; 2001–2017.	Individual participant data of randomized trials of 12–14 session IY in Europe with children aged 1–12 years.	No evidence that social disadvantage (including single-parent status, teen parenthood, low education, joblessness, low income) or ethnic minority status moderated the effect of intervention.
Gardner, Leijten, Melendez-Torres et al. (2019)	MA 1: $k = 13$; $N = 1,696$; age = 2–11 years; 63.5% male; 30% ethnic minority; 2001–2017. MA 2: $k = 156$; $N = 13,378$; age = 2–10 years ($M = 5.3$); 1980–2017.	MA 1: Individual participant data of randomized trials of 12–14 session IY in Europe with children aged 1–12 years. MA 2: Randomized trials of PMT interventions targeting disruptive child behavior based on social learning theory with 50% of sessions focused on parenting and children with M age 2–10 years.	MA 1: No evidence child age moderated the effect of IY intervention. MA 2: No evidence child age, developmental stage (preschool age vs. school age), or age range moderated the effect of parenting programs.
Leijten et al. (2019)	MA 1: $k = 154$; 1980–2017. MA 2: $k = 42$; 1994–2016.	MA 1: Randomized trials of PMT interventions targeting disruptive child behavior based on social learning theory with 50% of sessions focused on parenting and children with M age = 2–9 years. MA 2: As above, with the exception of children with M age = 1–11 years and behavioral and non-behavioral PMT programs. All studies included at least one follow-up assessment.	MA 1: Indicated prevention and treatment only moderated the effect of seven parenting techniques (i.e., positive reinforcement, praise, natural/logical discipline, relationship building, parent-child play, active listening, parental self-management) on intervention, such that overall effects were stronger in indicated prevention and treatment only relative to universal and selective prevention. MA 2: No evidence that parenting techniques moderated sustained effects of intervention.
Leijten, Melendez-Torres et al. (2018)	MA 1: $k = 156$; $N = 13,478$; M age = 2–9 years ($M = 4.93$); 1980–2017. MA 2: $k = 41$; $N = 5,648$; M age = 1–11 years ($M = 5.54$); 1994–2016.	MA 1: Randomized trials of PMT interventions targeting disruptive child behavior based on social learning theory with 50% of sessions focused on parenting and children with M age = 2–9 years. MA 2: Randomized trials of PMT interventions targeting disruptive child behavior that included at least one face-to-face meeting and assessments at least 1 month (and up to 3 years) after end of program with children with M age = 1–12 years.	MA 1: Relationship enhancement moderated the effect of intervention, such that relationship enhancement in addition to behavior management were associated with stronger treatment effects but weaker prevention effects. MA 2: No evidence that relationship enhancement in addition to behavior management resulted in stronger effects over time than behavior management only.
Leijten et al. (2013)	$k = 75$; 1980–2010.	Multiple-session PMT intervention and control programs targeting disruptive child behavior with children up to aged 12 years.	SES (defined dichotomously by each study's authors) moderated the effect of initial severity of disruptive behavior problems and PMT effectiveness, such that disadvantaged families benefited less from PMT when initial disruptive behavior problems was low. At 1-year follow-up, disadvantaged families benefited less from PMT, regardless of initial levels of disruptive behavior problems.
Leijten, Raaijmakers et al. (2018)	$k = 4$; $N = 786$; age = 2–10 years ($M = 5.79$); 29% ethnic minority; 2012–2017.	Individual family data from four IY intervention and control trials in the Netherlands.	Children's baseline conduct problems moderated the effect of intervention, such that children with higher levels of baseline conduct problems and emotional problems benefited more from intervention. No evidence that parental education or ethnic background, or children's ADHD symptoms moderated the effect of intervention. Moderator effects disappeared at follow-up (4 months or 12 months).
Leijten et al. (2020)	$k = 13$; $N = 1,696$; age = 2–10 years ($M = 5.26$); 63% male; 31% ethnic minority; 2001–2017.	Individual participant data of randomized trials of 12–14 session IY in Europe with children aged 2–10 years.	At both trial and individual participant levels, children with higher levels of conduct problems and mothers with higher levels of depression benefited more from intervention. Furthermore, the moderation effect of higher levels of conduct problems was partly accounted for by higher levels of maternal depression. No evidence that ADHD symptoms or emotional problems moderated effect of intervention at either trial or individual participant levels.

(Continued)

Table 1. (Continued).

Study	Sample	Inclusion criteria	Moderation results
Lösel and Beelmann (2003)	$k = 135$; $N = 16,723$; age = 4–18 years; 1971–2000.	Randomized child skills training programs targeting the prevention of antisocial behavior with children aged 0–18 years. Published in English or German.	Prevention approach moderated the effect of intervention, such that the ES was greater for indicated prevention relative to universal or selective prevention. No evidence that child gender and age moderated the effect of preventive intervention.
Lundahl et al. (2006)	$k = 63$; 1979–2003.	PMT intervention and control programs targeting disruptive child behaviors (but not criminal activity).	Economic disadvantage, single parent status, and initial severity of disruptive behavior moderated the effect of PMT, such that greater disadvantage and single parent status were associated with less intervention benefit, whereas greater initial disruptive behavior was associated with greater benefit. Individual training was associated with greater benefit than group training, especially for economically disadvantaged families. No evidence that child age moderated the effect of intervention.
Lundahl et al. (2008)	$k = 26$; $N = 2,040$; 1979–2002.	PMT programs targeting disruptive child behaviors with both intervention and control or waitlist groups. Only studies that reported whether fathers were included.	Father involvement moderated the effect of intervention, such that studies that included fathers showed greater positive outcomes in child disruptive behavior. These effects were not maintained at follow-up periods.
McCart et al. (2006)	PMT: $k = 30$; age = 3–12 years ($M = 5.44$); 55% male; 57% White, 29% Mixed; 1977–2004. CBT: $k = 41$; age = 5–18 years ($M = 11.28$); 60% male; 35% White, 38% Mixed; 1974–2004.	PMT or CBT targeting antisocial behavior with youth under 18 years. Considered PMT if it involved training caregivers in the use of behavioral management principles; considered CBT if it involved anger management, social skills training, or cognitive restructuring.	Intervention type moderated the effect of treatment, such that the ES for PMT was higher than for CBT among youth aged 6–12 years. There was a positive relation between age and CBT ES but no evidence that child age moderated effect of PMT.
Menting et al. (2013)	$k = 50$; $N = 4,745$; age = 3–9 years; 38.9–90.5% male; 1982–2010.	IY intervention and control studies reporting on measures of disruptive or prosocial child behavior.	Initial severity of disruptive behavior moderated the effect of intervention, such that greater initial disruptive behavior was associated with greater IY benefit. ES were larger for treatment samples than for prevention samples.
Sanders et al. (2014)	$k = 101$; $N = 16,099$; age = 0–18 years ($M = 5.85$); 57% conducted in Australia; 1980–2013.	Triple P program in English or German.	Study approach moderated the effect of intervention, such that treatment and targeted preventive intervention versions of Triple P were associated with better child outcomes than universal preventive versions of Triple P.
Smeets et al. (2015)	$k = 25$; $N = 2,302$; M age = 10.78 years; 68.6% male; 2000–2011.	Randomized CBT including coaching and modeling, anger management, social skills or assertiveness training reporting on measures of aggressive behavior with youth under 23 years. MA included PMT, other family-based interventions, skills training, and multicomponent interventions.	No evidence that youth gender, age, diagnosis of ODD/CD; setting (i.e., clinical, school, or home); or type (i.e., group, individual, or family) moderated treatment.
Sukhodolsky et al. (2004)	$k = 40$; $N = 1,953$; age = 7–17.2 years ($M = 12.5$); 43.7–100% male; 1977–1993.	Child-focused CBT targeting reduction in anger, aggressive, or antisocial behavior; or improvement of anger-related social-cognitive deficits, self-regulation or self-control, or social skills with children aged 6–18 years.	No evidence that youth gender, age, or problem severity; group versus individual format; or intervention setting (school, outpatient, inpatient, correctional facility) moderated the effect of intervention.
van der Stouwe et al. (2014)	$k = 22$; $N = 4,066$; 1986–2013.	MST treatment and control studies targeting antisocial, conduct disorder, or delinquent juveniles.	Studies in which the average age of youth participants was less than 15 years, youth were Caucasian or Indigenous, and studies conducted in the U.S. were associated with greater treatment effects on general delinquency. No evidence that child sex or living with biological parents moderated the effect of treatment.
van Stam et al. (2014)	MA 1: $k = 10$; $N = 796$; 1993–2012. MA 2: $k = 6$; $N = 1,179$; 1993–2012.	EQUIP and EQUIP-based treatment and control interventions on criminal recidivism in correctional facilities and school settings.	Gender and ethnicity moderated the effect of treatment on recidivism, such that being female was associated with reduction in recidivism and non-Caucasian participants showed smaller ES. In addition, studies conducted in the U.S. found a significant positive effect on recidivism, and more recent studies were associated with smaller ES. No evidence that age or time in prison moderated the effect of treatment on recidivism.
Ward et al. (2016)	$k = 12$; $N = 372$; 1991–2010.	PCIT with children diagnosed with ADHD, ODD, and/or CD aged 2–5 years.	No evidence that gender or diagnosis moderated the effect of treatment.

ADHD = attention-deficit/hyperactivity disorder; CBT = cognitive-behavioral therapy; CD = conduct disorder; ES = effect sizes; IY = Incredible Years; MA = meta-analysis; MST = Multisystemic Therapy; ODD = oppositional defiant disorder; PCIT = Parent-Child Interaction Therapy; PMT = parent management training; SES = socioeconomic status; U.S. = United States.

interventions have been more mixed. Researchers have found no evidence of sex/gender differences for social skills training as a preventive intervention (Lösel & Beelmann, 2003), CBT for anger-related problems (Sukhodolsky et al., 2004), MST (van der Stouwe et al., 2014), or for a variety of evidence-based interventions in the U.S. justice system (Leve et al., 2015). However, van Stam et al. (2014) reported that EQUIP's (a skills training approach for detained/incarcerated adolescents rated Probably Efficacious by McCart & Sheidow, 2016) effect on recidivism was limited to girls. Finally, a systematic review reported nonsignificant effects across a range of youth demographics, including child age, sex/gender, and *ethnicity* for interventions with adolescents (McCart & Sheidow, 2016). There is also some research to suggest that PMT can be comparably acceptable and effective across *culturally diverse* families (e.g., Gardner, Leijten, Harris et al., 2019; Kaminski & Claussen, 2017; Leijten, Raaijmakers et al., 2018). For example, the meta-analysis by Gardner, Leijten, Harris and colleagues (2019) found no effect of European ethnicity (as assessed by identifying as an ethnic minority [30%] or not [70%]) for IY. Additionally, there was no consistent pattern of moderation of the Fast Track multicomponent preventive intervention in elementary school across child sex, race (i.e., Black, White), and urban and rural sites (CPPRG, 2019).²

Parent characteristics

Potential parental moderators include family risk, parental sex/gender, and maternal depressive symptoms. Recent systematic reviews (Dedousis-Wallace et al., 2021; Shelleby & Shaw, 2014) concluded that the effects of PMT were robust across a variety of *family risk* factors (i.e., parental age, psychopathology, antisocial behavior, substance use, family/marital conflict, relational quality, social support, life stress). One challenge in examining *parental sex/gender* as a potential moderator is the longstanding exclusion of fathers in intervention research (Lundahl et al., 2008). However, a meta-analysis of PMT outcomes by Lundahl et al. (2008) reported that father engagement in parenting interventions was associated with greater reductions in CP. Also, one systematic review (McCart & Sheidow, 2016) found some

evidence that MST was more effective when fathers were involved. One meta-analysis reported that children with mothers with more *depressive symptoms* benefited more from IY and that the moderation effect due to initial severity of child CP (see above) was partly accounted for by its association with higher levels of maternal depressive symptoms (Leijten et al., 2020).

Sociodemographic characteristics

Moderating effects of *socioeconomic disadvantage* (e.g., educational disadvantage, low income or unemployment, impoverished neighborhood) have not been consistently found. For example, recent meta-analyses of individual participant data from European trials of IY (Gardner, Leijten, Harris et al., 2019; Leijten, Raaijmakers et al., 2018) found no moderation effects of socioeconomic disadvantage on child CP. Similarly, PMT effects were robust across socioeconomic characteristics (Dedousis-Wallace et al., 2021; Shelleby & Shaw, 2014). In contrast, socioeconomic disadvantage was associated with poorer child PMT outcomes in other meta-analyses (e.g., Leijten et al., 2013; Lundahl et al., 2006), and parents with university degrees had more positive child outcomes after participating in internet-based PMT programs (Florea et al., 2020).

Intervention characteristics

Intervention characteristics that potentially moderate intervention response include intervention type (PMT/family-based, skills training, or multicomponent interventions), intervention setting, number of protocol sessions, targeted prevention and treatment versus universal prevention approaches, specific PMT techniques, and individual versus group intervention.³ With respect to *intervention type*, PMT had a larger effect size than CBT skills training for children age 6–12 years (McCart et al., 2006). No significant moderator effects of a variety of CBT interventions have been found for *intervention setting* (e.g., clinic, school, home, correctional facility) or type (e.g., group, individual, family) (Smeets et al., 2015; Sukhodolsky et al., 2004). In their meta-analysis of internet-based PMT programs, Florea et al. (2020) found that a greater *number of protocol*

²Conversely, some meta-analytic findings suggest that larger effects for MST have been obtained for European American youth (in the U.S.) and U.S. samples (compared to non-U.S. samples) (van der Stouwe et al., 2014). Rather than reflecting moderator effects related to race/ethnicity, these latter findings may be linked to challenges in implementing MST in countries outside of the U.S. (e.g., poor treatment adherence), as well as to lower base rates and severity of offending behavior and to higher quality of usual care services (the typical control treatment to MST) in other countries (McMahon & Frick, 2019). Similarly, a recent meta-analysis suggests that EQUIP's effects on recidivism were positive only in studies conducted in the U.S., which seemed to be due to low implementation fidelity in European studies, and for Caucasian participants regardless of nationality (van Stam et al., 2014).

³Intervention integrity is another potential moderator of outcome for CP. A meta-analytic review by Goense et al. (2016) found that intervention integrity moderated the effects of evidence-based (mostly multicomponent) interventions for youth antisocial behavior. However, because nearly half (42.9%) of the effect sizes were based on substance abuse, it is not possible to draw any conclusions specific to CP.

sessions was associated with a greater decrease in child CP. Meta-analyses of Triple P (e.g., Sanders et al., 2014) and IY (e.g., Menting et al., 2013) have reported that *treatment* approaches (and for Triple P, also *targeted prevention*) evidence larger effect sizes on child behavior outcomes compared to *universal* prevention approaches (which typically deal with children with less severe CP). Similarly, Lösel and Beelmann (2003) reported a larger effect size for child skills training with indicated prevention samples than for universal and selected prevention samples.

A series of meta-analyses (e.g., Leijten et al., 2019; Leijten, Melendez-Torres et al., 2018) focused on identifying essential *parenting program techniques* of PMT interventions for children with CP. For example, PMT with treatment (clinic-referred or indicated) samples benefitted from the inclusion of relationship enhancement components (e.g., Child's Game in Hanf-based PMT programs; e.g., McMahon & Forehand, 2003) and more comprehensive sets of components (e.g., parental emotion regulation skills), whereas prevention (universal and selected) samples responded better with fewer intervention components. The meta-analysis by Lundahl et al. (2006) found that *individually administered* (as opposed to *group-administered*) PMT resulted in more positive child behavior outcomes, especially for economically disadvantaged families.

Summary

Overall, most of the research on moderation effects has been focused on PMT, with significantly less attention directed to moderators of other family-based interventions, skills training, and multicomponent interventions. The most robust finding is that interventions are more effective at higher initial severity of CP. Other variables for which there was consistent evidence for positive moderation of PMT effects were father engagement, higher maternal depressive symptoms, individual administration (vs. group), and treatment/targeted prevention approaches (vs. universal prevention). Evidence of moderation by child comorbid emotional problems and sociodemographic disadvantage in PMT has been mixed, as have sex/gender effects from some skills training and multicomponent interventions.

It is important to note that *absence* of significant moderation when an interaction is tested properly with sufficient power demonstrates the *generalizability* of intervention across subgroups or settings. Variables

where there was evidence for no moderation included child diagnostic status and family risk in PMT, and diagnostic status and intervention setting for skills training interventions. However, for some variables, evidence of moderation was dependent on intervention type. For example, although there were no moderation effects for child age and sex/gender for PMT, these variables did moderate outcomes for some skills training and multi-component interventions.

Future directions for research

Although there have been many meta-analytic studies that address moderation of intervention effectiveness for CP, they have been heterogeneous in their focus, moderators examined, and analytic methods (see Table 1). An encouraging development has been the use of innovative meta-analytic procedures, including integrative data analyses and individual participant data (Brown et al., 2013; Curran & Hussong, 2009). These approaches examine variance at both between- and within-trial levels and offer an advantage over aggregate-level meta-analyses that are at increased risk of bias and do not provide information on individual variability. However, these methods are used less often because they require the sharing of raw data. Future research should employ individual participant data meta-analytic methods for the testing of important moderating factors by capitalizing on best open science practices (see work of Leijten, Gardner, and colleagues).

Research to date has also been limited in testing child characteristics that have been important for designating etiologically important subgroups of children and adolescents with CP to determine if they also moderate intervention effects. Two such characteristics are *genetic characteristics*⁴ and *CU traits*. For example, boys (but not girls) with high dopaminergic polygenic plasticity index scores whose parents showed the greatest increase in positive parenting from IY had the greatest decline in parent-reported CP (Chhangur et al., 2017). Children in the Family Check-Up intervention with high polygenic risk scores were more likely to belong to a low CP trajectory group through ages 2 to 14 years, whereas control children with high risk scores were more likely to belong to a high CP trajectory group (Shaw et al., 2019).

Another child characteristic that has been important for causal theories of CP is CU traits, which are defined by an absence of guilt and empathy, a failure to put forth

⁴A recent meta-analytic review found clear evidence of genetic differential susceptibility in intervention studies focused on externalizing behaviors (van IJzendoorn & Bakermans-Kranenburg, 2015). However, because ADHD and substance use disorders were included in their definition of "externalizing," it is not possible to draw any conclusions specific to CP.

effort in important activities, and restricted display of affect (Frick et al., 2014). When these traits co-occur with CP, the child often displays a more severe and aggressive pattern of behavior (Frick et al., 2014). As a result, they are now included in major classification systems (e.g., ICD and DSM) for diagnosing subgroups of children with CP. While CU traits have been associated with more severe CP following treatment (Hawes et al., 2014), few studies have used randomized controlled designs to test them as a moderator of treatment outcome and the results of these studies have been inconsistent (Wilkinson et al., 2016). In fact, some studies have found that children and adolescents with CU traits actually show a larger decrease in CP following treatment relative to other children with CP (White et al., 2013). However, those elevated on CU traits often start treatment with the most severe CP and, despite showing a reduction in CP over the course of treatment, still exhibit the most severe CP after treatment. Thus, it is possible that CU traits are a predictor of poor outcome after treatment rather than a moderator of treatment effectiveness, although this needs to be tested in future research.

Most research on intervention moderation for CP has examined single variables separately. Future research should examine a broader range of moderators, control for the effects of multiple moderators, and examine multiple moderators simultaneously (Sanders et al., 2014). Moderator analyses also have focused on immediate post-intervention outcomes; whether moderation effects are sustained has not been well-established. This is often due to lack of follow-up data because of study design (e.g., waiting-list control conditions) or sample attrition. When moderation analyses have been conducted at follow-up, they often have been limited by insufficient power and by varying follow-up intervals. Several meta-analyses of PMT reported that moderation effects disappeared during follow-up assessments, ranging from 1 to 36 months (e.g., Leijten et al., 2019; Leijten, Melendez-Torres et al., 2018).

There is also emerging evidence that class-based or mixture models may identify moderator effects that are undetected by more traditional moderation analyses. Whereas the majority of moderation analyses of intervention effects have employed variable-centered approaches, which assume homogeneity of the effects of a moderating variable within the sample, mixture analytic approaches identify subgroups with a specific combination of characteristics that may influence intervention outcome. For example, one trial of IY examined whether families with both harsh or inconsistent

parenting and severe child CP would benefit most from the intervention (van Aar et al., 2019). Using latent growth curve analysis, the authors found that IY was most efficacious for those families with both harsh parenting and child CP; however, traditional moderation analyses identified only child CP as a significant moderator. Using a two-step latent class and latent growth modeling approach, Pelham et al. (2017) found a large intervention effect size of the Family Check-Up for individuals characterized by child neglect, legal problems, and parental mental health problems.

Analyses of moderated mediation can also be employed to modify existing interventions or to develop new ones (e.g., Howe, 2019). Moreover, these more complex models have the potential for informing developmental theory on the interplay of risk and protective factors, by examining whether the moderating effect of a variable (e.g., CU traits) is mitigated by reductions in a key mediating variable (e.g., parental warmth) brought about by intervention (Wilkinson et al., 2016). Ultimately, the goal of moderation analyses is to facilitate the “personalization” of interventions for child and adolescent CP with the goal of maximizing their effectiveness based on particular characteristics of the youth, their parents, broader sociodemographic characteristics, and the interventions themselves. While our review has documented impressive progress on many fronts, it also highlights the important work that lies ahead.⁵

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References

- *Meta-analytic studies included in Table 1.
American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.

⁵We acknowledge that the narrative nature of our review may temper the representativeness of our findings and conclusions.

- Brown, C. H., Sloboda, Z., Faggiano, F., Teasdale, B., Keller, F., Burkhart, G., Vigna-Taglianti, F., Howe, G., Masyn, K., Wang, W., Muthén, B., Stephens, P., Grey, S., & Perrino, T. (2013). Methods for synthesizing findings on moderation effects across multiple randomized trials. *Prevention Science, 14*(2), 144–156. <https://doi.org/10.1007/s11121-011-0207-8>
- Chhangur, R. R., Weeland, J., Overbeek, G., Matthys, W., de Castro, B. O., van der Giessen, D., & Belsky, J. (2017). Genetic moderation of intervention efficacy: Dopaminergic genes, the Incredible Years, and externalizing behavior in children. *Child Development, 88*(3), 796–811. <https://doi.org/10.1111/cdev.12612>
- Conduct Problems Prevention Research Group. (2007). Fast Track randomized controlled trial to prevent externalizing psychiatric disorders: Findings from grades 3 to 9. *Journal of the American Academy of Child & Adolescent Psychiatry, 46*(10), 1250–1262. <https://doi.org/10.1097/chi.0b013e31813e5d39>
- Conduct Problems Prevention Research Group. (2019). *The Fast Track program for children at risk: Preventing antisocial behavior*. Guilford Press.
- Curran, P. J., & Hussong, A. M. (2009). Integrative data analysis: The simultaneous analysis of multiple data sets. *Psychological Methods, 14*(2), 81–100. <https://doi.org/10.1037/a0015914>
- Dedousis-Wallace, A., Drysdale, S. A., McAloon, J., & Ollendick, T. H. (2021). Parental and familial predictors and moderators of parent management training programs for conduct problems in youth. *Clinical Child and Family Psychology Review, 24*(1), 92–119. <https://doi.org/10.1007/s10567-020-00330-4>
- *Flores, I. S., Dobrea, A., Păsăreanu, C. R., Georgescu, R. D., & Milea, I. (2020). The efficacy of internet-based parenting programs for children and adolescents with behavior problems: A meta-analysis of randomized clinical trials. *Clinical Child and Family Psychology Review, 23*(4), 510–528. <https://doi.org/10.1007/s10567-020-00326-0>
- Frick, P. J., Ray, J. V., Thornton, L. C., & Kahn, R. E. (2014). Can callous-unemotional traits enhance the understanding, diagnosis, and treatment of serious conduct problems in children and adolescents? A comprehensive review. *Psychological Bulletin, 140*(1), 1–57. <https://doi.org/10.1037/a0033076>
- *Gardner, F., Leijten, P., Harris, V., Mann, J., Hutchings, J., Beecham, J., Bonin, E.-M., Berry, V., McGilloway, S., Gaspar, M., Seabra-Santos, M. J., de Castro, B. O., Menting, A., Williams, M., Axberg, U., Morch, W.-T., Scott, S., & Landau, S. (2019). Equity effects of parenting interventions for child conduct problems: A pan-European individual participant data meta-analysis. *The Lancet Psychiatry, 6*(6), 518–527. [https://doi.org/10.1016/S2215-0366\(19\)30162-2](https://doi.org/10.1016/S2215-0366(19)30162-2)
- *Gardner, F., Leijten, P., Melendez-Torres, G. J., Landau, S., Harris, V., Mann, J., Beecham, J., Hutchings, J., & Scott, S. (2019). The earlier the better?: Individual participant data and traditional meta-analysis of age effects of parenting interventions for pre-adolescent children. *Child Development, 90*(1), 7–19. <https://doi.org/10.1111/cdev.13138>
- Goense, P. B., Assink, M., Stams, G.-J., Boendermaker, L., & Hoeve, M. (2016). Making “what works” work: A meta-analytic study of the effect of treatment integrity on outcomes of evidence-based interventions for juveniles with antisocial behavior. *Aggression and Violent Behavior, 31*(1), 106–115. <https://dx.doi.org/10.1016/j.avb.2016.08.003>
- Hawes, D. J., Price, M. J., & Dadds, M. R. (2014). Callous-unemotional traits and the treatment of conduct problems in childhood and adolescence: A comprehensive review. *Clinical Child and Family Psychology Review, 17*(3), 248–267. <https://doi.org/10.1007/s10567-014-0167-1>
- Howe, G. W. (2019). Using baseline target moderation to guide decisions on adapting prevention programs. *Development and Psychopathology, 31*(5), 1777–1788. <https://doi.org/10.1017/S0954579419001044>
- Kaminski, J. W., & Claussen, A. H. (2017). Evidence base update for psychosocial treatments for disruptive behaviors in children. *Journal of Clinical Child and Adolescent Psychology, 46*(4), 477–499. <https://doi.org/10.1080/15374416.2017.1310044>
- Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry, 59*(10), 877–883. <https://doi.org/10.1001/archpsyc.59.10.877>
- *Leijten, P., Gardner, F., Melendez-Torres, G. J., van Aar, J., Hutchings, J., Schulz, S., Knerr, W., & Overbeek, G. (2019). Meta-analyses: Key parenting program components for disruptive child behavior. *Journal of the American Academy of Child & Adolescent Psychiatry, 58*(2), 180–190. <https://doi.org/10.1016/j.jaac.2018.07.900>
- *Leijten, P., Melendez-Torres, G. J., Gardner, F., van Aar, J., Schulz, S., & Overbeek, G. (2018). Are relationship enhancement and behavior management “The Golden Couple” for disruptive child behavior?: Two meta-analyses. *Child Development, 89*(6), 1970–1982. <https://doi.org/10.1111/cdev.13051>
- *Leijten, P., Raaijmakers, M. A., de Castro, B. O., & Matthys, W. (2013). Does socioeconomic status matter? A meta-analysis on parent training effectiveness for disruptive child behavior. *Journal of Clinical Child & Adolescent Psychology, 42*(3), 384–392. <https://doi.org/10.1080/15374416.2013.769169>
- *Leijten, P., Raaijmakers, M., Wijngaards, L., Matthys, W., Menting, A., Hemnick-van-Putten, M., & de Castro, B. O. (2018). Understanding who benefits from parenting interventions for children’s conduct problems: An integrative data analysis. *Prevention Science, 19*(4), 579–588. <https://doi.org/10.1007/s11121-018-0864-y>
- *Leijten, P., Scott, S., Landau, S., Harris, V., Mann, J., Hutchings, J., Beecham, J., & Gardner, F. (2020). Individual participant data meta-analysis: Impact of conduct problem severity, comorbid attention-deficit/hyperactivity disorder and emotional problems, and maternal depression on parenting program effects. *Journal of the American Academy of Child & Adolescent Psychiatry, 59*(8), 933–943. <https://doi.org/10.1016/j.jaac.2020.01.023>
- Leve, L. D., Chamberlain, P., & Kim, H. K. (2015). Risks, outcomes, and evidence-based interventions for girls in the US juvenile justice system. *Clinical Child and Family Psychology Review, 18*(3), 252–279. <https://doi.org/10.1007/s10567-015-0186-6>
- *Lösel, F., & Beelmann, A. (2003). Effects of child skills training in preventing antisocial behavior: A systematic review of randomized evaluations. *Annals of the American*

- Academy of Political and Social Science*, 587(1), 84–109. <https://doi.org/10.1177/0002716202250793>
- *Lundahl, B., Risser, H. J., & Lovejoy, M. C. (2006). A meta-analysis of parent training: Moderators and follow-up effects. *Clinical Psychology Review*, 26(1), 86–104. <https://doi.org/10.1016/j.cpr.2005.07.004>
- *Lundahl, B. W., Tollefson, D., Risser, H., & Lovejoy, M. C. (2008). A meta-analysis of father involvement in parent training. *Research on Social Work Practice*, 18(2), 97–106. <https://doi.org/10.1177/1049731507309828>
- *McCart, M. R., Priester, P. E., Davies, W. H., & Azen, R. (2006). Differential effectiveness of behavioral parent-training and cognitive-behavioral therapy for antisocial youth: A meta-analysis. *Journal of Abnormal Child Psychology*, 34(4), 525–541. <https://doi.org/10.1007/s10802-006-9031-1>
- McCart, M. R., & Sheidow, A. J. (2016). Evidence-based psychosocial treatments for adolescents with disruptive behavior. *Journal of Clinical Child & Adolescent Psychology*, 45(5), 529–563. <https://doi.org/10.1080/15374416.2016.1146990>
- McMahon, R. J., & Forehand, R. L. (2003). *Helping the Noncompliant Child: Family based treatment for oppositional behavior* (2nd ed.). Guilford Press.
- McMahon, R. J., & Frick, P. J. (2019). Conduct and oppositional disorders. In M. J. Prinstein, E. A. Youngstrom, E. J. Mash, & R. A. Barkley (Eds.), *Treatment of disorders in childhood and adolescence* (4th ed., pp. 102–172). Guilford Press.
- *Menting, A. T. A., de Castro, B. O., & Matthys, W. (2013). Effectiveness of the Incredible Years parent training to modify disruptive and prosocial child behavior: A meta-analytic review. *Clinical Psychology Review*, 33(8), 901–913. <https://doi.org/10.1016/j.cpr.2013.07.006>
- Pelham, W. E., Dishion, T. J., Tein, J. Y., Shaw, D. S., & Wilson, M. N. (2017). What doesn't work for whom? Exploring heterogeneity in responsiveness to the Family Check-Up in early childhood using a mixture model approach. *Prevention Science*, 18(8), 911–922. <https://doi.org/10.1007/s11121-017-0805-1>
- *Sanders, M. R., Kirby, J. N., Tellegen, C. L., & Day, J. J. (2014). The Triple P-Positive Parenting Program: A systematic review and meta-analysis of a multi-level system of parenting support. *Clinical Psychology Review*, 34(4), 337–357. <https://doi.org/10.1016/j.cpr.2014.04.003>
- Shaw, D. S., Galán, C. A., Lemery-Chalfant, K., Dishion, T. J., Elam, K. K., Wilson, M. N., & Gardner, F. (2019). Trajectories and predictors of children's early-starting conduct problems: Child, family, genetic, and intervention effects. *Development and Psychopathology*, 31(5), 1911–1921. <https://doi.org/10.1017/S0954579419000828>
- Shelleby, E. C., & Shaw, D. S. (2014). Outcomes of parenting interventions for child conduct problems: A review of differential effectiveness. *Child Psychiatry and Human Development*, 45(5), 628–645. <https://doi.org/10.1007/s10578-013-0431-5>
- *Smeets, K. C., Leeijen, A. A. M., van der Molen, M. J., Scheepers, F. R., Buitelaar, J. K., & Rommelse, N. N. J. (2015). Treatment moderators of cognitive behavior therapy to reduce aggressive behavior: A meta-analysis. *European Child and Adolescent Psychiatry*, 24(3), 255–264. <https://doi.org/10.1007/s00787-014-0592-1>
- *Sukhodolsky, D. G., Kassinove, H., & Gorman, B. S. (2004). Cognitive-behavioral therapy for anger in children and adolescents: A meta-analysis. *Aggression and Violent Behavior*, 9(3), 247–269. <https://doi.org/10.1016/j.avb.2003.08.005>
- van Aar, J., Leijten, P., de Castro, B. O., Weeland, J., Matthys, W., Chhangur, R., & Overbeek, G. (2019). Families who benefit and families who do not: Integrating person-and variable-centered analyses of parenting intervention responses. *Journal of the American Academy of Child & Adolescent Psychiatry*, 58(10), 993–1003. <https://doi.org/10.1016/j.jaac.2019.02.004>
- *van der Stouwe, T., Asscher, J. J., Stams, G. J. J., Deković, M., & van der Laan, P. H. (2014). The effectiveness of Multisystemic Therapy (MST): A meta-analysis. *Clinical Psychology Review*, 34(6), 468–481. <https://doi.org/10.1016/j.cpr.2014.06.006>
- van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2015). Genetic differential susceptibility on trial: Meta-analytic support from randomized controlled experiments. *Development and Psychopathology*, 27(1), 151–162. <https://doi.org/10.1017/S0954579414001369>
- *van Stam, M. A., van der Shuur, W. A., Tserkezis, S., van Vugt, E. S., Asscher, J. J., Gibbs, J. C., & Stams, G. J. J. M. (2014). The effectiveness of EQUIP on sociomoral development and recidivism reduction: A meta-analytic study. *Children and Youth Services Review*, 38(1), 44–51. <https://doi.org/10.1016/j.childyouth.2014.01.002>
- *Ward, M. A., Theule, J., & Cheung, K. (2016). Parent-Child Interaction Therapy for child disruptive behaviour disorders: A meta-analysis. *Child and Youth Care Forum*, 45(5), 675–690. <https://doi.org/10.1007/s10566-016-9350-5>
- White, S. F., Frick, P. J., Lawing, K., & Bauer, D. (2013). Callous-unemotional traits and response to Functional Family Therapy to adolescent offenders. *Behavioral Sciences & the Law*, 31(2), 271–285. <https://doi.org/10.1002/bsl.2041>
- Wilkinson, S., Waller, R., & Viding, E. (2016). Practitioner review: Involving young people with callous unemotional traits in treatment—does it work? A systematic review. *Journal of Child Psychology and Psychiatry*, 57(5), 552–565. <https://doi.org/10.1111/jcpp.12494>