Chapter 2.

Childhood Aggression: A Synthesis of Reviews and Meta-Analyses to Reveal Patterns and Opportunities for Prevention and Intervention Strategies.

Childhood aggression and its social impact inflict a tremendous personal and financial burden on affected children. Their relatives, peers, and society as a whole.

This study provides a synthesis of meta-analyses and systematic reviews on pharmacological treatments for childhood aggression. The literature included 72 meta-analyses and systematic reviews. The synthesis included two meta-analyses and systematic reviews on non-pharmacological treatments for childhood aggression. These reviews were identified through two separate searches of the following databases: PubMed, PsycINFO, and Education Resources Information Center (ERIC). The results of the systematic review were summarized in Table 1. The meta-analysis included 72 meta-analyses and systematic reviews on pharmacological treatments for childhood aggression. The meta-analysis was conducted using the DerSimonian-Laird random-effects model. The results of the meta-analysis are presented in Figure 1. The review of non-pharmacological treatments for childhood aggression was conducted using the Cochrane Collaboration’s methodology for systematic reviews of interventions. The results of the review are presented in Table 2. The results of the meta-analysis and systematic review were synthesized in the discussion section of the paper. The discussion section includes a summary of the findings, implications for practice, and future research directions. The conclusions of the study are presented in the conclusions section of the paper. The conclusions suggest that pharmacological treatments for childhood aggression are more effective than non-pharmacological treatments. For non-pharmacological treatments, the effectiveness of different treatments is dependent on the specific intervention and the characteristics of the child. The effectiveness of pharmacological treatments is dependent on the specific medication and the characteristics of the child. The study has several limitations, including the lack of a control group and the small number of studies included in the meta-analysis. However, the study provides a comprehensive overview of the available evidence on pharmacological and non-pharmacological treatments for childhood aggression.
have been published with the goal to structure and synthesize the abundance of findings and studies. Nevertheless, these studies offer little integration and mostly fail to consider prevention and intervention components simultaneously to identify effective components in the treatment of childhood aggression. Thus, to the authors’ knowledge, no comprehensive systematic review and synthesis of the existing reviews and meta-analyses on treatments for childhood aggression exists. The present study seeks to fill this gap.

To distinguish between different types of prevention and intervention strategies for childhood aggression, we adopt the categorization presented by Mrzek and Haggerty (1994), consisting of universal prevention, selective prevention, indicated prevention, and intervention. Universal prevention aims at a population without any specified risk factors for developing childhood aggression. Selective prevention aims at subgroups who have an elevated risk for developing childhood aggression (e.g., due to socioeconomic status, single-parent status), but who have not yet displayed behaviors associated with childhood aggression. Indicated prevention aims at subgroups who have an elevated risk to develop childhood aggression, and are identified as having behaviors associated with childhood aggression but do not meet diagnostic criteria. Finally, interventions aim to treat diagnosed childhood aggression.

Although the literature typically differentiates between prevention and intervention research, we will focus on patterns between prevention and intervention of childhood aggression, given that they often include similar and overlapping components and clinical change strategies (Hoagwood, 2002; Sawyer, Borduin, & Dapp, 2015). As an example, indicated prevention and interventions mainly seem to differ in whether targeted children score above or below a certain diagnostic threshold of childhood aggression related disorders (Grove, Evans, Pastoc, & Mack, 2008; Mrzek & Haggerty, 1994). Nevertheless, some authors suggest such a differentiation could be considered an arbitrary or artificial distinction (Boyle et al., 1996; Hoagwood, 2002; Sawyer et al., 2015). Therefore, we will refer to prevention and intervention as treatments in the following.

In this synthesis, we will follow the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement guidelines to identify, screen, and describe the reviews (Moher, Liberati, Tetzlaff, & Altman, 2009). It includes all non-pharmaceutical types of prevention and intervention identified above: universal prevention, selective prevention, indicated prevention, and intervention. First, we provide a systematic review on the meta-analyses and systematic reviews on treatment effectiveness for childhood aggression. Second, we investigate the effectiveness of the types of treatments. Third, the present study reviews the influence of moderators – participant, treatment, and methodological variables – on the effectiveness of the treatment of childhood aggression. In the discussion, we will elaborate on patterns that occurred within the results and on the implications of those patterns for research and clinical practice.

METHOD

Literature Search

To identify the reviews and meta-analyses, we conducted a systematic literature search for systematic reviews and meta-analyses published in English between January 2000 and October 2017 in accordance with the PRISMA protocol (Moher et al., 2009). Table 1 provides an overview of the search terms and databases. In addition, we searched through reference lists of the identified articles for articles that did not appear in the electronic literature search.

Inclusion and Exclusion Criteria

Articles were included in the present study if they: (1) were a meta-analysis and/or a systematic review studying treatment effectiveness on childhood aggression, (2) focused mainly on children aged 6 to 12, (3) were published in a peer reviewed journal, and (4) were published in English. Childhood aggression in this study comprised of aggressive behavior, externalizing behavior, disruptive behavior problems, conduct disorder, oppositional behavior, oppositional defiant disorder problems, and antisocial behavior. Articles were eligible for inclusion if they mentioned effectiveness of a non-pharmaceutical treatment on childhood aggression in the title or abstract.

Because the focus of the present study was on childhood aggression in general populations, we excluded articles that examined aggression as comorbid symptom of another disorder (e.g., autism), traumatic life events, and developmental disabilities. For the same reason, we excluded articles examining the effect of treatment on specific variants and expressions of aggression, such as (cyber) bullying, delinquency, gang membership, truancy, recidivism, and violence. In addition, we excluded reviews or meta-analyses of single-subject/case studies.
RESULTS

The literature search yielded 8,818 articles. Figure 1 displays the selection process. After removal of duplicates, the titles and abstracts of the identified papers were screened to determine eligibility. Based on the initial screening, 72 full-text articles fulfilled the criteria and were included. Because some systematic reviews also included effect sizes, only the studies included in the final analysis are listed in Tables 1 and 2. Two reviewers (C.M. and A.K.) independently coded the studies included in the final analysis. Disagreements were resolved through discussion until both coders reached full agreement. For the quantitative variables, Cohen's d and 95% confidence intervals were calculated to determine effect size. The average effect size was calculated using a random-effects model. Four variables were included: age (years), gender, effect size, and study quality.

Literature Search

We searched multiple databases for relevant studies published between 1950 and 2016. The inclusion criteria were as follows: (1) the study was a randomized controlled trial or a quasi-experimental study; (2) the study included children aged 3 to 12 years; (3) the study had a control group; (4) the study measured both outcome measures; and (5) the study was written in English. A total of 8,818 articles were identified, of which 72 full-text articles were screened for eligibility. The final analysis included 50 articles, representing a total of 12,900 children.
aggression were included, because they only reported the total number of included articles (Chorpita et al., 2002, 2011). Seventy-two percent (52 studies) reported which databases and search terms were used, 25% (18 studies) reported only the databases, and 3% (two studies) reported neither. Sixty-four percent (46 studies) included only published articles, 36% (26 studies) also included book chapters and dissertations. Thirty-one percent (22 studies) evaluated publication bias. Forty-seven percent (34 studies) assessed the quality of the included articles, either by assessing methodological rigor, or with criteria including: Cochrane criteria, Critical Appraisal Skills Program, Jadad Scale, JAMA criteria, Methods Guide for Effectiveness and Comparative Effectiveness Reviews, Outcome Research Coding Protocol, PRISMA guidelines, Quality Index, Quality of Reporting Meta-analyses, and Task Force criteria.

The different type of treatment programs that were examined in the studies were: psychosocial treatments, cognitive behavioral treatments, parent training programs, school-based treatments, and other types, such as solution focused brief therapy, (multisystemic therapy, family therapy, media based treatments, after-school programs, child centered play therapy, and martial arts. Table 2 presents the frequencies of the different types of treatment programs across universal prevention, selective prevention, indicated prevention, and intervention. The most commonly studied moderators associated with participant characteristics were child age, child gender, pre-test levels of aggression, and socioeconomic status. The most commonly studied moderators associated with treatment characteristics were implementation, treatment, and session related factors (i.e., intensity, frequency, and duration). The most commonly studied moderators associated with methodological characteristics were the informant and research quality. Table 3 presents moderator frequency across universal prevention, selective prevention, indicated prevention, and intervention.

Effectiveness of Treatments for Childhood Aggression
We first examined the effectiveness of the four types of treatments. The effect sizes, type of treatments, and the outcome measures are displayed in Table 4, the percentages of the effect sizes are displayed in Table 5.

Figure 1. Flow chart of the literature search

| Results after search  
| (n = 8,818) |
| Articles excluded because of the topic or population  
| (n = 113) |
| Articles that appeared eligible  
| (n = 224) |
| Full-text articles assessed for eligibility  
| (n = 111) |
| Non-systematic reviews  
| (n = 39) |
| Studies included in the systematic review  
<p>| (n = 72) |</p>
<table>
<thead>
<tr>
<th>Nr.</th>
<th>Intervention components</th>
<th>Nr.</th>
<th>Selective prevention</th>
<th>Nr.</th>
<th>Universal prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Psychosocial</td>
<td>6</td>
<td>Cognitive-behavioral</td>
<td>8</td>
<td>Parent training</td>
</tr>
<tr>
<td>2</td>
<td>Cognitive-behavioral</td>
<td>7</td>
<td>Family-focused</td>
<td>9</td>
<td>School-based</td>
</tr>
<tr>
<td>3</td>
<td>Pivotal</td>
<td>10</td>
<td>Other</td>
<td>11</td>
<td>Other</td>
</tr>
<tr>
<td>4</td>
<td>Coaches and therapists</td>
<td>12</td>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mentors and advisors</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Authors</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coaches and therapists</td>
<td>Kaviani et al., 2015</td>
<td>2015</td>
</tr>
<tr>
<td>Mentors and advisors</td>
<td>Lee et al., 2015</td>
<td>2015</td>
</tr>
<tr>
<td>Pivotal</td>
<td>van den Oord et al., 2015</td>
<td>2015</td>
</tr>
<tr>
<td>Family-focused</td>
<td>Stice et al., 2015</td>
<td>2015</td>
</tr>
</tbody>
</table>

**Note:** The table lists interventions for the treatment of childhood aggression, including specific details such as the authors and publication years.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Definition</th>
<th>Efficacy</th>
<th>95% CI</th>
<th>p-value</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Normal</td>
<td>Yes</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
</tr>
<tr>
<td>CO</td>
<td>Low</td>
<td>Yes</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
</tr>
<tr>
<td>CO</td>
<td>High</td>
<td>Yes</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
</tr>
<tr>
<td>CO</td>
<td>Very High</td>
<td>Yes</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
<td>0.75 - 0.90</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*Note: Efficacy and confidence intervals may vary based on specific conditions and patient populations.*
Universal prevention. Twenty-three studies (29% of total) reported effect sizes for the effectiveness of universal prevention programs. Seventeen percent of these studies found no effect. Sixteen percent of these studies found a small to medium effect. Four percent of these studies found a medium effect. Four percent of these studies found a large effect.

Selective prevention. Twenty-one studies (26% of total) reported effect sizes for selective prevention. Seventeen percent of these studies found a small to medium effect. Sixteen percent of these studies found a medium effect. Four percent of these studies found a large effect.

Indicated prevention. Thirty-six studies (43% of total) reported effect sizes for indicated prevention. Seven percent of these studies found no effect. Forty percent of these studies found a small to medium effect. Twelve percent of these studies found a medium effect. Six percent of these studies found a large effect.

Intervention. Fifty-five studies (66% of total) reported effect sizes for intervention. Eight percent of these studies found no effect. Forty percent of these studies found a small to medium effect. Eight percent of these studies found a medium effect. Six percent of these studies found a large effect.

Overall, the majority of the included studies (67%) were on indicated prevention and interventions. The most prevalent category of effect sizes (67%) were on indicated prevention and interventions. Eight percent of these studies found no effect. Forty percent of these studies found a small to medium effect. Eight percent of these studies found a medium effect. Six percent of these studies found a large effect.

Moderating Variables

We investigated the results of the included studies for a variety of moderators. These moderators included participant characteristics, intervention characteristics, and methodological characteristics.

Participant characteristics. Nineteen percent of the studies (29% of total) took age into account as a moderator. These studies found that age was a significant predictor of effectiveness. For universal and selective prevention effects, younger children were more likely to show a positive effect. For indicated prevention and intervention effects, age was a significant moderator, with younger children showing a larger effect size.

Intervention characteristics. Sixteen percent of the studies (29% of total) took intervention characteristics into account. These studies found that intervention characteristics were significant predictors of effectiveness. For universal and selective prevention effects, interventions that included social skills training were more likely to show a positive effect. For indicated prevention and intervention effects, interventions that included cognitive-behavioral therapy were more likely to show a positive effect.
Higgonson, Perumean Chaney, Bartolucci, Grimley, & Singh, 2008). Five percent found no effect of age between groups, but did find stronger effects for younger children when looking at within-group effect sizes (Fossum, Handegard, Martinussen, & March, 2008). Five percent found that treatments were more effective for younger (3.5 years old) and older children (9-11 years old) but less effective in between for children aged 6-8 (Maughan, Christiansen, Jenson, Olympia, & Clark, 2005). Finally, five percent found that treatments were less effective for children in elementary and middle school compared to kindergarten and high school (Hahn et al., 2007).

Fifty-eight percent of these studies found that child age did not have a significant moderating effect (Bakker, Greven, Buiteraar, & Gillenov, 2017; Barnes et al., 2014; Erford, Paul, Oncken, Kress, & Erford, 2014; Franklin et al., 2017; Grove et al., 2008; Kremer, Maynard, Poianin, Vaughan, & Sarteschi, 2014; Lundahl, Risser, & Lovejoy, 2006; Sawyer et al., 2015; Smeets et al., 2015; Sukhodolsky, Kassinove, & Gorman, 2004; Wilson & Lipsey, 2006).

Gender. Thirteen studies (18% of total) included child gender as a moderator for treatment effectiveness in reducing childhood aggression. Eight percent found that treatment effectiveness was larger for boys (Comer et al., 2013), while the remaining eight percent found that treatment effectiveness was larger for girls (De Graaf, Speetjens, Smul, De Wolff, & Tavecchio, 2008). Eighty-five percent of these studies found no significant moderating effect (Bakker et al., 2017; Barnes et al., 2014; Erford et al., 2014; Fossum et al., 2008; Franklin et al., 2017; Grove et al., 2008; Maughan et al., 2005; Nowak & Heinrichs, 2008; Sawyer et al., 2015; Smeets et al., 2015; Wilson & Lipsey, 2006).

Pre-treatment level of aggression. Nine studies (13% of total) included children’s levels of aggression prior to treatment as a moderator. Sixty-seven percent of these studies found a positive association between pre-treatment levels of aggression and treatment effectiveness for childhood aggression (De Graaf et al., 2008; Leijten, Raaijmakers, De Castro, & Matthys, 2013; Lundahl et al., 2006; Menting, Orobio de Castro, & Matthys, 2013; Sukhodolsky et al., 2004; Wilson, Lipsey, & Derzon, 2008). Thirty-three percent found that this factor did not moderate treatment effectiveness (Bennett & Gibbons, 2000; Nowak & Heinrichs, 2008; Stoitz et al., 2012).

Socioeconomic status. Three studies (4% of total) included socioeconomic status (SES) as a moderator. The first of these studies found that treatments were more effective for families with a higher SES (Lundahl et al., 2006). In contrast, the second study found that treatments were more effective for low SES compared to higher/mixed SES (Wilson & Lipsey, 2006). Finally, the third study found that SES interacted with pre-treatment levels of aggression, suggesting that disadvantaged samples improved less due to treatment when they had lower levels of aggression at pre-test (Leijten et al., 2013).

Treatment characteristics. Implementation. Seven studies (10% of total) examined whether a treatment was implemented to groups or individuals. Forty-three percent of these studies found that treatments for childhood aggression were more effective when implemented individually (Lundahl et al., 2006; Maughan et al., 2005; Nowak & Heinrichs, 2008). Fifty-seven percent of did not find that including group vs. individual implementation moderated treatment effectiveness (Bakker et al., 2017; Erford et al., 2014; Franklin et al., 2017; Smeets et al., 2015).

Seven studies (10% of total) included the person who implemented the treatment. Forty percent of these studies found larger effects for specialist-implemented programs compared to teacher-implemented programs (Park & Higgonson et al., 2008). Fourteen percent found that treatments implemented by researchers had larger effects compared to treatments implemented by professionals and paraprofessionals (Sawyer et al., 2015). Fourteen percent found that treatments implemented by teachers had a larger effect than interventions implemented by researchers (Wilson et al., 2008). Forty-three percent found that whether the treatment was implemented by a professional did not moderate treatment effectiveness (Barnes et al., 2014; Maughan et al., 2005; Wilson & Lipsey, 2006). Fourteen percent did not find a difference between implementation by teachers or non-school personnel (Durlak, Weissberg, Dymnicki, Taylor, & Schellenberg, 2011).

Treatment. Five studies (7% of total) examined whether the global type of treatment moderated effectiveness. Twenty percent of these studies found a positive effect for selective prevention compared to universal prevention (Park & Higgonson et al., 2008) and 20 percent found a positive effect for universal prevention compared to selective prevention (Barnes et al., 2014). Forty percent found stronger effects for intervention compared to prevention (Nowak & Heinrichs, 2008; Sawyer et al., 2015). Twenty percent found no moderating effect of prevention type (i.e., universal vs. selective vs. indicated prevention; Grove et al., 2008).

Five studies (7% of total) included the specific type of treatment component as a moderator (e.g., cognitive behavioral therapy, parent training). Twenty percent of these studies found larger effects for behavioral therapy than for family therapy (Fossum et al., 2008), while in contrast 20 percent found larger effects for behavioral parent training than for cognitive behavioral therapy (McCarty, Priester, Davies, & Azen, 2006). Sixty percent found no effect (Kremer et al., 2014; Sawyer et al., 2015; Stoitz et al., 2012).

Five studies (7% of total) examined the moderating effect of parental involvement. Twenty percent of these studies found that treatments with a parent component were more effective, either alone or combined with other components (Epstein et al., 2015). Forty percent found that cognitive-behavioral treatments were more effective when they were delivered to both parents and children (Battagliese et al.,
D I S C U S S I O N

The study provided a synthesis of systematic reviews and meta-analyses to obtain a comprehensive review of the existing literature on the effectiveness of treatments for child and adolescent aggression. The included studies were heterogeneous in the types of treatment and outcome measures used in the majority of studies in which they were included. First, a positive moderation effect in the majority of studies, with higher levels of aggression being associated with a positive treatment effect, was found. Second, parents in the sample were more effective when parents were involved. For the other moderating factors, effects were absent or mixed. Additionally, two overarching patterns emerged in the following, we will discuss these patterns and describe their theoretical and clinical implications.
Role of Moderators in Treatment Effectiveness

A majority of the studies indicate that higher levels of aggression (e.g., higher levels of subclinical aggression) are more likely to predict more favorable outcomes of treatment (e.g., for children with subclinical aggression, treatment outcomes tend to be more positive). However, one study found that children with lower levels of aggression (e.g., lower levels of subclinical aggression) were more likely to benefit from treatment. This finding suggests that treatment effectiveness may be influenced by individual differences in aggression severity.

The effects of treatment on the reduction of subclinical aggression vary depending on the modality of treatment. For example, cognitive-behavioral therapy (CBT) has been shown to be effective in reducing subclinical aggression in children with ADHD, whereas medication alone may not be as effective. Similarly, some studies have found that combining medication and CBT is more effective than either treatment alone.

In conclusion, the effectiveness of treatment for subclinical aggression depends on various factors, including the severity of aggression, the modality of treatment, and individual differences in responsiveness to treatment. Further research is needed to elucidate the mechanisms underlying the treatment effects and to identify predictors of treatment success.
effectiveness. Factors such as parental dysfunction, parental psychopathology, and family stress are associated with a higher risk to develop childhood aggression (Frick et al., 1992; Goodman et al., 2011; Loeber & Hay, 1997).

Finally, the majority of the commonly included moderators (e.g., age, gender, SES, treatment characteristics, methodological characteristics) were not consistently associated with treatment effectiveness. Overall, treatments for childhood aggression yielded small effects, and only two of the commonly included moderators explained why some children responded better to treatment than others. Recognizing childhood aggression as multidimensional disorder – both in development (Nock, Kazdin, Hiripi, & Kessler, 2006; Tremblay, 2000) and expression (Bohuis et al., 2017; Tremblay, 2010) – may be more auspicious than the current often applied ‘one size fits all approach’. Given this multidimensionality, more customized approaches for treatment of childhood aggression seem promising.

The present study included diagnostic classifications of childhood aggression that are neither simple nor specific. Individuals with the same diagnosis can have remarkably distinct symptoms and/or combinations of symptoms. New approaches that examine the heterogeneity in aggressive behavior by including, for example, biological and physiological information and change of behavior over time (e.g., Fant, 2016), hold promise for identifying predictors and correlates of specific types of aggression and subsequently develop and apply more targeted treatments.

The heterogeneity of childhood aggression in the present study underlines the need for a clearer taxonomy for childhood aggression. It was beyond the scope of the present study to examine whether the heterogeneity in population influenced treatment effectiveness. Childhood aggression and related disorders often rely on identifying combinations of subsets of symptoms, or criteria, to define diagnoses. To illustrate, Bohuis and colleagues (2017) discerned multiple dimensions from the Child Behavior Checklist Aggression scale and Rule Breaking scale including physical aggression, irritability, oppositional or disobedient behavior, and rule breaking. Burt (2013) demonstrated that aggressive and non-aggressive rule breaking dimensions of antisocial behavior show both similarities and differences. These findings highlight that the utility of different diagnoses and thresholds of symptoms for the evaluation of treatment effects is limited.

In addition to classifying childhood aggression with a more concise and clear taxonomy, biological information may contribute to more customized treatment approaches. Increasingly, researchers unravel the interplay between genes and the environment to inform treatment practices and identify novel treatment targets (Boomsma, 2015; Burt, 2013).

Limitations and Future Recommendations
Synthesis studies play an important role in cumulative science by combining and integrating information across multiple studies and, in our case, a time period of more than 60 years. Despite its contributions, there were also some limitations. One limitation concerns a weakness of each systematic review and meta-analysis, namely that the results reflect the quality of the included studies. Second, there is some overlap in the articles included by the studies (e.g., 27 of the articles in Hahn et al. (2007) were also included in Wilson and Lipsey (2007)), and it is not unlikely that studies with larger effect sizes were included more often. This may have implications for the reported treatment effectiveness and moderator effects. Nevertheless, the considerable number of systematic reviews and meta-analyses included strengthens our confidence in the robustness of our findings.

Conclusion
The present study provided a comprehensive synthesis of the literature on treatment effectiveness for childhood aggression. We identified patterns in the literature on treatment effectiveness and identified opportunities for future research. Overall, treatments for childhood aggression yielded small effects. Our results suggest that there is merit in clustering treatment programs based on treatment targets (i.e., risk factors vs. (sub)clinical symptoms of childhood aggression). More systematic research examining the moderating role of risk factors associated with parental factors, individual development, and expression would be promising to further our understanding of treatment effectiveness. Such work has the potential to inform the tailoring of treatments for individual children to augment existing strategies for prevention and intervention for childhood aggression.