Chapter 7

Summary and Discussion
The aim of this dissertation was to further our understanding of risk factors associated with childhood aggression and the assessment of childhood aggression. To this end, Chapter 2 comprised an overview of meta-analyses and systematic reviews on treatment effectiveness and its moderators for childhood aggression. In addition, Chapter 3 to 5 examined macro-level and micro-level predictors of childhood and adolescent aggression and moderation on the contribution of genetic and environmental factors to individual differences in childhood aggression. Finally, Chapter 6 tested the agreement between different instruments commonly used to assess aggressive behavior. Table 1 briefly describes the aims and highlights of each chapter. The next paragraphs provide a more elaborate summary of each chapter.

The goal of Chapter 2 was to enhance our understanding of treatment effectiveness for childhood aggression. Therefore, Chapter 2 presented a literature synthesis of 72 meta-analyses and systematic reviews that examined effectiveness of treatments for childhood aggression. The study reviewed the characteristics of the meta-analyses and systematic reviews, such as size across types of treatments, effects of various moderators (such as participant variables, treatment variables, and methodological variables). Treatments included psychosocial (non-pharmacological) universal prevention, selective prevention, indicated prevention, and intervention. The conclusion was that for universal and selective prevention, effects were mostly absent or small; for indicated prevention and intervention, effects were mostly small to medium. Furthermore, most moderators of treatment effectiveness had no effect in the majority of studies (i.e., child age, child gender, implementation to individuals or groups, person implementing the intervention, different treatment programs, and session related factors or treatment intensity) or mixed effects (i.e., socioeconomic status, type of treatment, informant, research quality). The only two significant moderators comprised of pre-treatment levels of aggression and parental involvement. Treatment effectiveness was higher for children with higher levels of aggression before treatment and when parents were involved in the treatment.

The discussion elaborated on two patterns that emerged within the results and on the implications of those patterns for research and clinical practice. First, the results identified similarities between universal and selective prevention compared to indicated prevention and intervention, respectively. Second, results revealed that based on existing research it is not yet possible to distinguish subgroups of children that would benefit more from treatment for aggression than others. The positive moderating effect of parental involvement on treatment effectiveness for childhood aggression suggests an opportunity for future research may be to focus more on parental influences as possible moderators of treatment effectiveness. In addition, more systematic research attention for the association between individual factors and treatment effectiveness for childhood aggression would be promising.

Table 1. Research aim and highlights of each chapter.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Research aim</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Create an overview of overall treatment effectiveness and its moderators for childhood aggression</td>
<td>Effects sizes for treatments for childhood aggression were mostly small. Promising distinction between treating aggression vs. treating associated factors. Treatment might benefit from a stronger emphasis on individual differences.</td>
</tr>
<tr>
<td>3</td>
<td>Examine the association between national-level policies for child and adolescent mental health (CAMH) and adolescent mental health.</td>
<td>The association between policies for CAMH and adolescent aggressive behavior was negative; aggressive behaviors were higher in countries with less policies. This association held when controlling for other national-level variables. There was no association between policies for CAMH and adolescent life satisfaction or psychosomatic symptoms.</td>
</tr>
<tr>
<td>4</td>
<td>Predict childhood aggression based on a large sample with a broad set of predictor variables.</td>
<td>Regression coefficients were in line with previous research, yet weaker, probably due to simultaneous inclusion. Most important predictors were externalizing, non-aggressive behaviors such as arguing, being easily distracted, and hyperactivity. These behaviors may function as salient targets for early detection and prevention of childhood aggression.</td>
</tr>
<tr>
<td>5</td>
<td>Investigate the moderating effect of socioeconomic status (SES) on the genetic architecture of childhood aggressive behavior.</td>
<td>SES moderated the contribution of genetic and environmental factors to childhood aggressive behavior. Heritability was higher; the contribution of the shared environment was lower; and the contribution of the non-shared environment was higher for children from high SES families compared to children from low or medium SES families. This pattern was similar in the Netherlands and the United Kingdom.</td>
</tr>
<tr>
<td>6</td>
<td>Assess the agreement between different measures of childhood aggressive behavior.</td>
<td>Concordance in item content was low. Concordance between diagnoses was low. Correlations between measures were moderate to high. Generic overlap was moderate to high. The extent to which different measures of childhood aggressive behavior converge reflects the type (i.e., item content, clinical concordance, correlation, genetic overlap) of agreement considered.</td>
</tr>
</tbody>
</table>

To examine the extent to which national-level variables explain variance in aggression, Chapter 3 assessed the association between national-level policies for child and adolescent mental health (CAMH) and individual-level adolescent mental health. Data were from 172,829 adolescents aged eleven to fifteen years, from 30 European countries in the 2013/14 Health Behaviour in School-aged Children (HBSC) study. Adolescent mental health indicators comprised aggressive behavior, life satisfaction, and psychosomatic symptoms. Information on national-level policies for CAMH was gathered from renowned statistical institutes and included availability of epidemiological data, the number of CAMH facilities, investment in family benefits, and investment in education. In addition, to ascertain that the association between
behavior in 7-year-old children. Data were from the Netherlands Twin Register (NTR; 1) and from the Twin Early Development Study (TEDS; 2), the Twin and environmental factors. Results revealed that SIS moderated the contribution of genetic and environmental factors to the variance in childhood aggression. The contribution of genetic factors was higher for children from a low SES background compared to children from a high SES background. The contribution of environmental factors was higher for children from a high SES background compared to children from a low SES background. The contribution of genetic factors was similar across SES strata, while the contribution of environmental factors was lower for children from a low SES background compared to children from a high SES background. The pattern was similar for children in other countries, although the magnitude of the effects varied. Further work is needed to examine the extent to which the use of different measures has implications for outcomes. Therefore, the purpose of this chapter is to assess the extent to which genetic and environmental factors contribute to childhood aggression in children and siblings. The findings reveal that both genetic and environmental factors contribute to childhood aggression in children and siblings. The findings also suggest that genetic and environmental factors contribute to childhood aggression in children and siblings. The findings further show that genetic and environmental factors contribute to childhood aggression in children and siblings. The findings indicate that genetic and environmental factors contribute to childhood aggression in children and siblings. The findings highlight the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings suggest that genetic and environmental factors contribute to childhood aggression in children and siblings. The findings demonstrate that genetic and environmental factors contribute to childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings highlight the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings demonstrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings emphasize the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings stress the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings underscore the importance of genetic and environmental factors in the development of childhood aggression in children and siblings. The findings illustrate the importance of genetic and environmental factors in the development of childhood aggression in children and siblings.
yielded higher agreement (i.e., moderate to strong) than clinical cutoff scores. Genetic correlations ranged from weak to very strong, depending on the measure of aggressive behavior and correlation. Unlike observed correlations, which are the analyses of clinical concordance and correlation, we conclude that the genetic correlations were not influenced by the measurement error. Therefore, the high genetic correlations might suggest that the different measures of aggressive behavior were highly consistent.

The section discusses implications with regards to the overlap of development and behavior problems in the present study, genetic correlations were not influenced by the measure of behavioral problems in the present study, and genetic factors influence both psychological and behavioral problems. Gender differences in the overlap of genetic correlations were not significant. The results of this study suggest that genetic factors may contribute to the overlap of development and behavior problems.

The implications of this study for the understanding of the overlap of genetic factors in both psychological and behavioral problems are shown in the following sections.

Implications for Treatment, Prediction, and Assessment

This section discusses implications with regards to the overlap of development and behavior problems in the present study, genetic correlations were not influenced by the measure of behavioral problems in the present study, and genetic factors influence both psychological and behavioral problems. Gender differences in the overlap of genetic correlations were not significant. The results of this study suggest that genetic factors may contribute to the overlap of development and behavior problems.

The implications of this study for the understanding of the overlap of genetic factors in both psychological and behavioral problems are shown in the following sections.
Kahl, Nelle, & Kamps, 2013; Kudina & Korneva, 2016; Kahl & Burt, 2014). To some extent, policies for child and adolescent mental health, such as investment in family mental health services, have been implemented in some regions (Braddock, Carvalho, Jenkins, & Laps, 2009; Signorini et al., 2017). For example, in Sweden, the number of facilities for children and adolescents with mental health difficulties increased in the last two years, but there are still regions without child and adolescent mental health services (Kumpe, 2019). This implies that the information on child and adolescent mental health services may not be fully represented. Moreover, the results from Chapter 4 indicate that the recognition and understanding of the problems associated with child and adolescent mental health and adolescent mental health is needed to better understand this association. The importance of behavioral symptoms, family factors, and clinical outcomes for the prediction of child and adolescent mental health and adolescent mental health was discussed in Chapter 1. Of the many behavioral symptoms reported in existing research (Battista et al., 2005, 2008, 2010; Biederman, 2004; Biederman & Faraone, 2005; Biederman, Faraone, & Schinazi, 2005), three findings need to be interpreted taking into account the socio-cultural and family factors. First, many behavioral symptoms are found to generally overlap with child and adolescent aggression (Faith, Krupinski, & Lapp, 2005). Second, if race is taken into account, the overlap between child and adolescent aggression and child and adolescent mental health is likely due to genetic overlap, as evidenced by studies that showed an important association between child and adolescent aggression and child and adolescent mental health. Finally, child and adolescent mental health and adolescent mental health were overestimated compared to child and adolescent aggression and child and adolescent mental health. For instance, growing up with related parental child and adolescent mental health control, neglectful parenting is consistently related to child and adolescent aggression, psychological control, and early-emotional neglect is associated with increased risk of child and adolescent aggression (Larsson, Wahlbeck, & Modag, 2008; Drew, 2007; Pinna, 2007). Exposure to interparental violence also contributes to childhood aggression (Johnson, 2005; Pinna, 2007). Exposure to interparental violence may be more robust among families with child and adolescent mental health and adolescent mental health, as demonstrated in Chapter 2. To pass a more complete picture of the factors associated with and different levels of child and adolescent aggression, future research requires the inclusion of other risk factors and different levels of context. The results from Chapter 5 indicated that the shared environment contributes more to the individual differences in childhood aggression in children from low and medium SES backgrounds compared to children from high SES backgrounds. This finding suggests that children from low or medium SES backgrounds would benefit more from treatment to improve their family functioning. Examples of such shared environment factors include family discord, parenting styles, and family organization. Chapter 4 showed that children with subthreshold levels of aggression are as likely to have stress-related qualities as children with high levels of aggression. Chapter 3 showed that children with subthreshold levels of aggression are as likely to have stress-related qualities as children with high levels of aggression. Chapter 2 showed that children with subthreshold levels of aggression are as likely to have stress-related qualities as children with high levels of aggression.
to benefit from treatment as children with above-threshold levels of aggression. Altogether, these findings suggest that a dimensional approach to the assessment of childhood aggression would be promising, especially when combining data that use different measures.

The research in this dissertation, especially in Chapters 3, 4, 5, and 6, focused on the more overt and physical types of aggression. Nonetheless, childhood aggression may take other forms, such as indirect or relational aggression. These types of aggression do not occur in direct confrontation, as is the case for fighting or bullying, but comprise behaviors such as manipulation or social exclusion (Björkqvist, Lagerspetz, & Kaukiainen, 1992; Vaillancourt, Brendgen, Boivin, & Tremblay, 2003). Overt/physical aggression may differ in etiology from indirect or relational aggression, as suggested by the partial genetic correlations (i.e., .54 for boys and .43 for boys; Léthander, Bartels, Hoekstra, Hudziak, & Boomsma, 2005). This suggests that it is uncertain whether the results from this dissertation would apply to other types of aggression. Future research that, for example, examines whether the predictors for childhood aggression found in Chapter 4, such as arguing, being easily distracted, and hyperactivity, also predict indirect or relational aggression would reveal whether or not the same targets may be useful for early detection and prevention for different types of aggression.

The results from Chapter 3 to Chapter 6 need to be interpreted as cross-sectional. The conclusions are not causal, however, future longitudinal research may reveal the direction of effect, such as whether the predictors in Chapter 3 and Chapter 4 are a cause or an effect of higher levels of aggression. In addition, the chapters did not allow for an examination of developmental trajectories (e.g., which risk factors best predict the onset and development of childhood aggression at which age). Longitudinal research is needed to uncover whether predictors such as parental education level, maternal smoking during pregnancy, or hyperactivity as found in Chapter 4 are equally predictive across development. A reason to suspect differential predictor effects across age is that child development is marked by different developmental stages with their accompanying landmarks for development, such as the formation of attachment around the 6-12 month period or development of the ability to inhibit aggressive outbursts, which develops in children aged 4 to 7 years old (Bakermans-Kranenburg, IJzendoorn, & Juffer, 2003; Wachs, Georgieff, Cusick, & Moewen, 2014). These different stages suggest that children vary in sensitivity for risk factors across development. To illustrate, a meta-analysis revealed that the concurrent association between parental emotion socialization behaviors and childhood aggression decreases with age (Johnston, Hawes, Eisenberg, Kohlhoff, & Dudeny, 2017). In addition, prior work revealed that the contribution of genetic and environmental factors to childhood aggression varies across age; the shared environment explains around 44% of individual differences in childhood, but this influence disappears in adolescence (Porsch et al., 2016; Wesseldijk et al., 2017). It would be useful to examine at what age childhood aggression can be best predicted by which risk factors to optimally detect children most likely to become aggressive early enough to prevent worse outcomes from later diagnosis and treatment (e.g., Campbell, Lundstrom, Larsson, Lichtenstein, & Lubke, 2018).

GENERAL CONCLUSION
Within ACTION, the goal was to inform the development of prevention and treatment strategies. The wealth of available data and expertise within ACTION permitted examination of new research questions. The studies in this dissertation highlighted the complexities in the etiology of childhood aggression. Childhood aggression is found to be associated with a broad range of factors, from country level policies to more proximal factors as the family environment, and individual level factors such as behavior and genetics, which may also interact. Assessing whether children score above or below a clinical cut-off for inclusion for treatment may lead to children to be excluded from treatment from which they would benefit as much as children who score above a clinical cut-off. Moreover, measures of aggressive behavior agree only to a small extent on which children display clinical levels of aggression, which may cause children to miss out on treatment not because of their level of aggression, but because of the measure selected to assess their aggression.

Although the influence of the broad range of factors discussed in this dissertation on childhood aggression adds complexity to the etiology of childhood aggression, it also provides opportunities to improve prevention and intervention strategies for childhood aggression. For example, inclusion of parental characteristics (i.e., a family based approach) in diagnosis and treatment might improve treatment effectiveness for childhood aggression. Additionally, more policies for child and adolescent mental health were associated with lower levels of aggressive behaviors, which suggests a merit in employment of policies as early prevention efforts. Moreover, differences in etiology of aggression as a result of socioeconomic background highlight that it is promising to distinguish subgroups of children more likely to develop childhood aggression and children more likely to benefit from treatment. The research in this dissertation contributes to previous work to advance our understanding of treatment, prediction, and assessment of childhood aggression and provided directions for future research working towards a more personalized approach to childhood aggression.