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OPENING THE BLACK BOX | Examining Effective Components of Interventions for Children's Social-Emotional Development | Brechtje de Mooij

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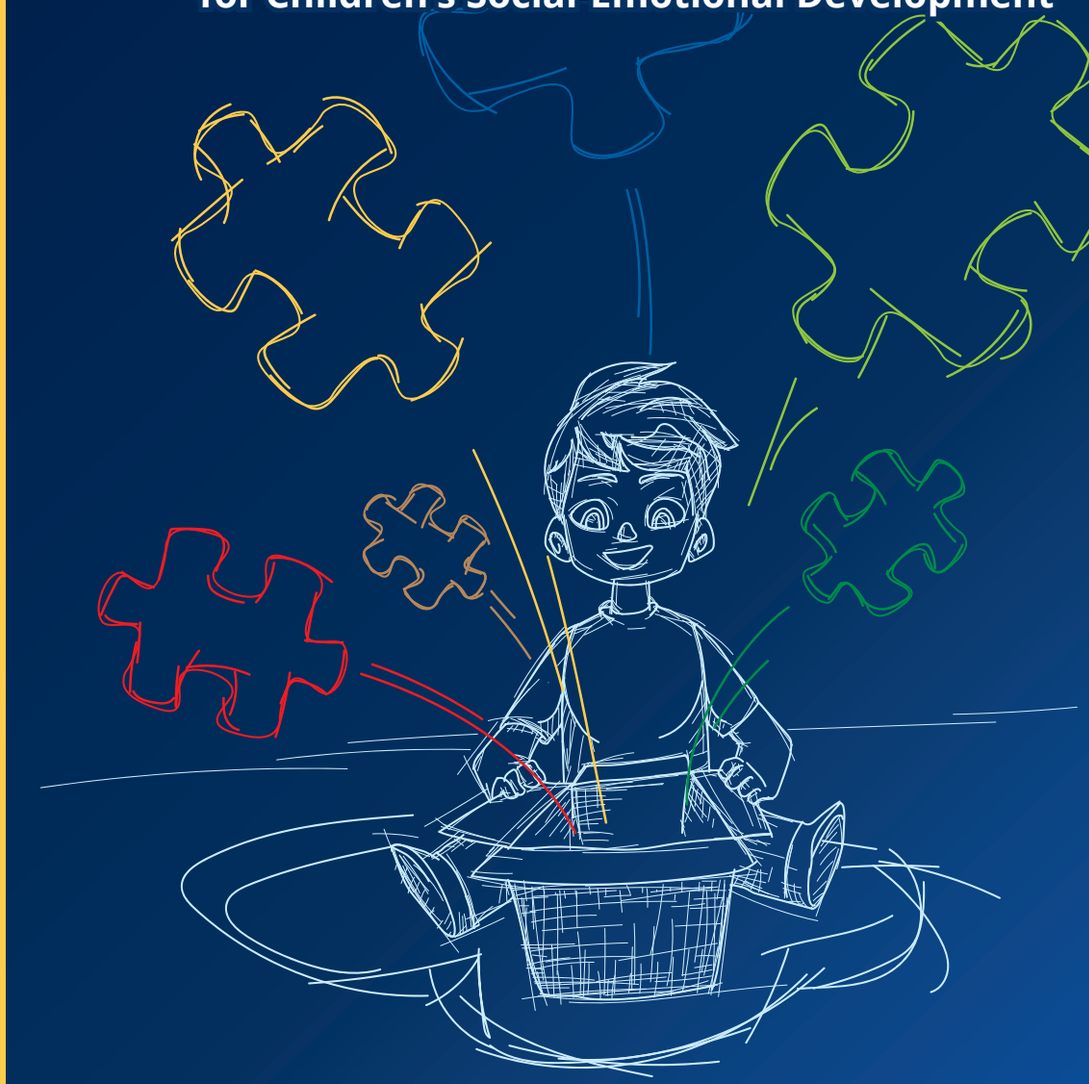

Brechtje de Mooij

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Examining Effective Components of Interventions for Children's Social-Emotional Development

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor

aan de Universiteit van Amsterdam

op gezag van de Rector Magnificus

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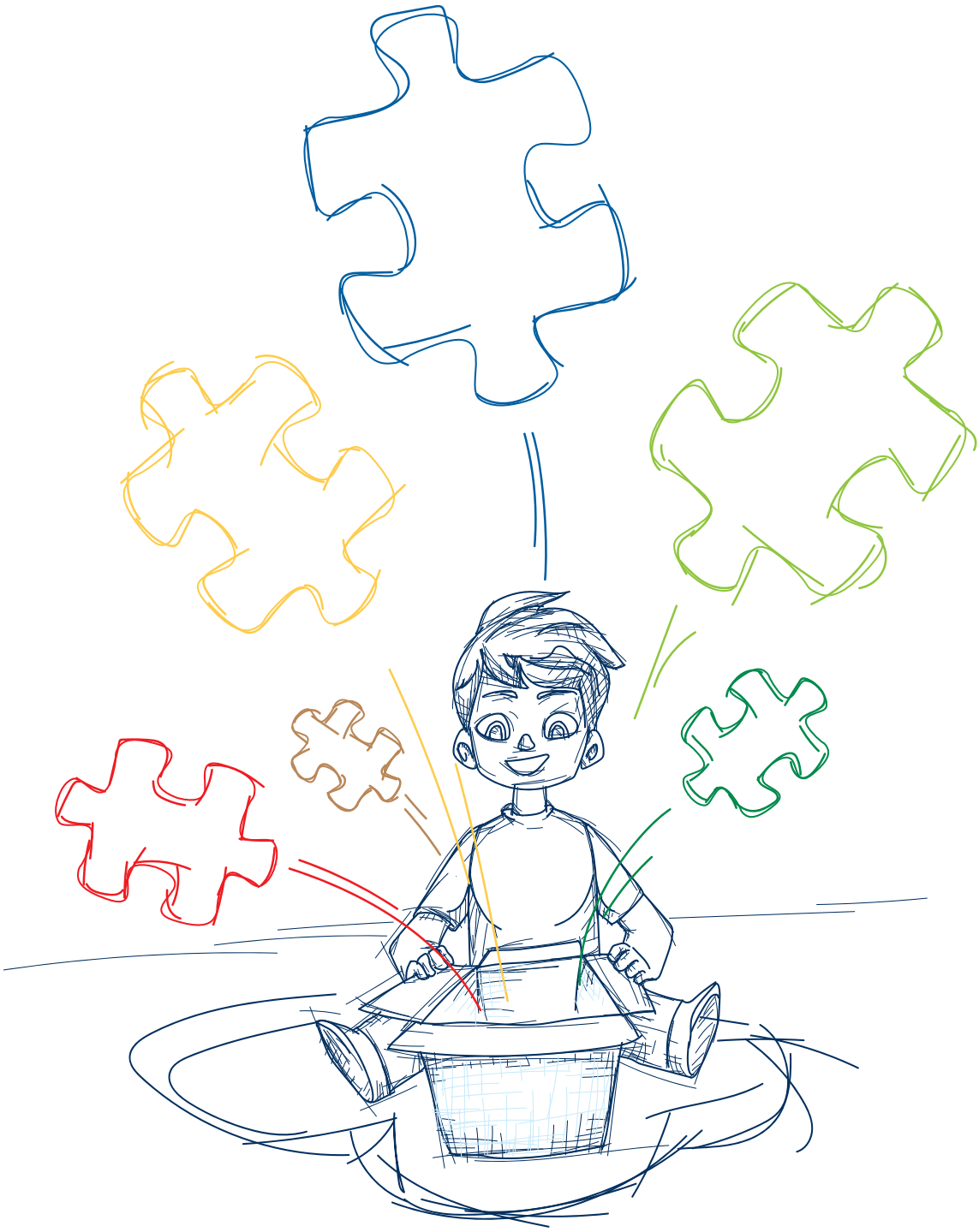


CHAPTER 1

General Introduction: Opening The Black Box of Social-Emotional Skills Interventions?

Knowing when it is appropriate to initiate a conversation, saying "no" and setting boundaries. Asking to join in, interpreting if you have upset someone from their facial expression, not standing too close, but not too far away either. Complimenting a friend, asking for help. These are just a few examples of the many mundane, social tasks in which people engage. Our sense of well-being greatly depends on the success of our interactions with others, and our ability to establish and maintain satisfying relationships. In turn, our success in social situations and relationships depends on the social-emotional skill set that we have available to us, and our ability to use it (e.g., Denham et al., 2009; Spence, 2003). The focus of this dissertation is on these mundane but essential skills, and on how to improve them. Specifically, we focus on specific intervention components that are effective in improving children's social-emotional skills, with the ultimate goal of contributing to children's social-emotional development and overall well-being.

Social-Emotional Development

Social-emotional development refers to the process in which children grow or change in their understanding of who they are, what they think and feel, and how they establish positive relationships in ways that stimulate happiness in life (Aviles et al., 2006; Zins & Elias, 2007). The development into a well-rounded, happy individual requires the mastery of many social-emotional skills. *Social-emotional skills* is the collective noun used to indicate all behavioral, emotional, and cognitive skills that integrate into our ability to adapt to the social world around us flexibly. The term *social-emotional competence* is a collective noun that refers to this integrated ability. Social-emotional skills are both intrapersonal (i.e., taking place within a person, emotional competence), and interpersonal (i.e., taking place between persons, social competence; e.g., Denham et al., 2009; Spence, 2003). Children's social-emotional skills develop through the mastery of increasingly complex skills over time (i.e., increase/maturation of social ability), as well as increasing efficiency and accuracy in performing previously acquired skills (Beauchamp & Anderson, 2010). This development of social-emotional skills starts at birth, and developmental delays in social-emotional competence can already be visible in two-year-olds (e.g., Carter et al., 2004). Moreover, the interaction between the child and the (social) environment influences this development (Zins & Elias, 2007).

Social-emotional skills are vital for our relationships with others. For example, having more friends in childhood is associated with social-emotional skills such as prosocial skills, adequate emotion regulation, and self-disclosure (e.g., Gest et al., 2001; von Salisch et al., 2013). Social-emotional competence in peer groups and close friendships are related to higher well-being in adolescents (e.g., Larson et al., 2007), and assertiveness and expression of emotions are associated with higher marital and relationship satisfaction (e.g., Villa & Del Prette, 2013). Research has even shown that friendship quality can buffer the adverse effects of negative parenting (e.g., Gaertner et al., 2010; Lansford et al., 2003).

An impairment in social-emotional skills can present itself as internalizing (e.g., Segrin, 2000) as well as externalizing problem behavior (e.g., Trentacosta & Fine, 2010). To illustrate, some children may be afraid of negative evaluations by others (i.e., social

anxiety), and experience problems in their friendships as a result. Other children might evaluate themselves negatively and reject themselves, and therefore assume others will too (i.e., low self-esteem). On the other end of the spectrum are children that show little concern for others (i.e., low prosocial behavior) or are easily angered and prone to lash out (i.e., externalizing problem behavior), facing troubles in their peer relationships as a consequence. Deficits in social-emotional skills acquisition or performance can thus occur in different forms and can have various effects on children's behavior (Spence, 2003).

Indeed, previous research has shown that children with social-emotional skills deficits have adverse outcomes on different life domains. Longitudinal analyses have linked a social competence deficit in childhood to internalizing problem behavior in adolescence, which extended into adulthood (Burt et al., 2008). Children with low social competence at age four showed more internalizing behavior at age ten (Bornstein et al., 2010). Research also showed that poor social skills are a predictor of externalizing behavior (Gresham et al., 1999). Longitudinal analyses showed that children with lower social competence at age four showed more externalizing behavior at age ten and age 14 (Bornstein et al., 2010), and that childhood peer relationship problems are predictive of externalizing behavior six years later (Prinstein & La Graca, 2004).

Furthermore, previous research has shown that social skills deficits are related to academic failure (e.g., Malecki & Elliot, 2002; Welsh et al., 2001). Meta-analysis showed that both academic failure and social skills deficits are related to risky (health) behavior like substance abuse and delinquency (Najaka et al., 2001). Conversely, social competence in childhood is related to positive employment experiences in adulthood (e.g., Jones et al., 2017), better job performance (e.g., Porath & Bateman, 2006), and higher salaries (e.g., Ferris et al., 2001).

Overall, previous research demonstrates that children's social-emotional skills influence the development of psychopathology, health impairments, and difficulties and conflict in social relationships. Not surprisingly, a deficit in social competence is an integral part of many clinical diagnoses (Cook et al., 2010).

Social-Emotional Skills Interventions for Children and Adolescents

As social-emotional skills forecast individuals' health and well-being at many stages in life, a large body of intervention programs was developed over the past decades that aim to enhance children's social-emotional competence and (peer) relationships. The overarching goal of social-emotional skills interventions is to improve children's social functioning. By extension, the objective of social-emotional skills interventions is to interrupt the negative consequences that an impairment of skills may have on children's development and help children grow up to be healthy adults.

Interventions can target different prevention levels, that basically target different subgroups of the population of children and adolescents at large (Greenberg & Abenavoli, 2017). Universal prevention interventions are designed to benefit all children or adolescents and aim to promote adaptive behavior or reduce risk factors for adverse

well-being outcomes in the general population (see DeRosier, 2004, for an example of an intervention). Selective interventions target children or adolescents at risk of developing or showing emerging problem behavior or peer relationship problems. These programs generally target smaller groups of children with specific risk markers, such as low self-esteem or heightened levels of social anxiety (see Beidel et al., 2000, for an example of an intervention). Indicated interventions target special populations of children, such as children with clinical levels of diagnoses or traumatic brain injury. Universal and selective interventions are often implemented in the school context, whereas indicated interventions can also be implemented in a clinical context. Moreover, most evidence-based social-emotional skills interventions operate at the universal and selective intervention level (Gresham, 2015).

Stimulating the development of children's and adolescents' social-emotional skills in the school context has gained importance over the past decades. A sizeable research program has developed as a consequence—apparent from a large number of studies and meta-analyses (e.g., Blyth et al., 2019; Mahoney et al., 2019; Weare & Nind, 2011) that assessed if these programs instigate significant behavioral change. We should not underestimate the necessity of this research on the effectiveness of social-emotional skills intervention programs as the body of social-emotional skills intervention programs is continuously evolving, with programs leaving the stage and new programs entering the scene frequently. To illustrate, at the start of the research described in this dissertation (2016), the database of the Dutch Youth Institute (Nederlands Jeugdinstituut [NJi], n.d.) included 32 universal and selective interventions that address children's and adolescents' social-emotional competence. At the time of writing (2020), however, only 16 of these programs remained in the database. For only two of these programs, effectiveness was shown using a randomized controlled trial, considered the strongest level of evidence. For another seven programs, quasi-experimental research found indications for effectiveness. The remaining seven interventions are considered theoretically well-founded, but empirical evidence was not (yet) provided, considered the lowest level of evidence. Evidence for interventions in the database is re-evaluated after five years. The 16 interventions that were no longer in the Dutch Youth Institute-database at the time of writing were removed from the database either because the intervention was not submitted for re-evaluation (e.g., because the intervention is not used often) or because the intervention did not make it through the assessment procedure. One intervention was in the process of evaluation (NJi, n.d.).

The Importance of Gaining Insight Into Effective Components

Systematic reviews of over 300 research reports have shown that social-emotional skills interventions generally yield small to moderate positive effects on children's social-emotional skills and behavior (e.g., Durlak et al., 2011; Lösel & Beelman, 2003; Sklad et al., 2012; Taylor et al., 2017), with effect sizes (Cohen's *d*) ranging from .13 to .57 (with an outlier found in Sklad et al. 2012 for social-emotional skills [$d = .70$]). A review of five meta-analyses found a weighted effect size of .63 of social-emotional skills interventions for children with or at risk for emotional-behavioral disorders (Cook et al., 2010).

Although generally, social-emotional skills interventions are effective, the impact found for these interventions vary, and the reasons for this are unknown. Additionally, there seems to be much overlap in the contents of psychotherapeutic interventions, which might explain the relative nonsignificant differences between them, and calls for research into factors that explain intervention effects (Laksa et al., 2014). In other words, there is much to be learned about these widely popular and used interventions.

This dissertation, therefore, intends to advance the field by addressing the question: "*What components of preventive childhood social-emotional skills interventions drive intervention effects?*". Most interventions aimed at enhancing children's social and emotional skills are multifaceted and draw from the same list of ingredients to compile an intervention "cocktail" (Leijten et al., 2015). Even so, the actual composition of intervention components varies greatly. Because until now research into the effectiveness of social-emotional skills interventions mostly focused on the effect of the "cocktail" as a whole, it remains unclear which of the ingredients included in the intervention "cocktail" are actually responsible for children's behavioral adjustments following an intervention.

Different terms are used in the intervention literature to refer to the content-related constituents of interventions, such as active ingredients, intervention kernels, behavior change techniques, common elements, and core components (e.g., Abraham & Michie, 2008; Chorpita & Daleiden, 2009; Embry & Biglan, 2008). In this dissertation, we use the term *intervention component* to refer to the units of an intervention that serve as levers of behavior change. As our predecessors in the field of intervention research pointed out, it is crucial to pursue more sharply defined questions concerning the effects of social-emotional skills interventions, one of which is what specific components drive intervention effects (e.g., Mahoney et al., 2019).

Knowledge of the effects of intervention components is essential for several reasons. First, it provides information for the development of new, efficient, and cost-effective programs. Second, it allows for the improvement of currently implemented interventions and aids practitioners in making better-informed decisions when selecting a program from the vast amount of interventions currently available (Durlak, 2015). Third, research into complete interventions is costly and time-consuming, and evidence at the protocol level is delicate: changes to the protocol require renewed evidence (Chorpita et al., 2005a). Research into intervention components is relatively inexpensive in comparison (Leijten et al., 2015). Fourth, knowledge about intervention component effects enables the implementation of such components in a more flexible, modular way (Chorpita et al., 2005b), which may also simplify the assessment of intervention effectiveness by databases like the Dutch Youth Institute-database (NJi, n.d.). Finally, determining which components of social-emotional skills interventions are effective in improving children's and adolescents' social behavior may produce new insights into the mechanisms of change of interventions (Chorpita & Daleiden, 2009).

There are multiple research approaches to examine the effects of intervention components (Leijten et al., submitted). The current dissertation employed two of these approaches. We used a meta-analytical approach to synthesize findings from previous

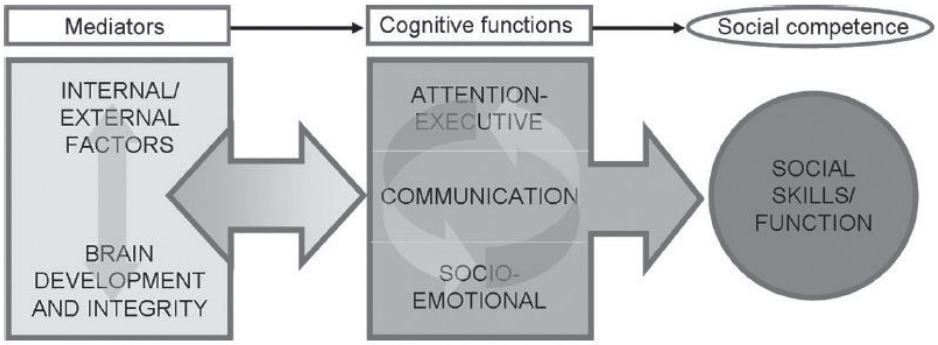
research into social-emotional skills interventions and assess whether their success is associated with the presence or absence of specific intervention components. Second, we used a microtrial approach. Microtrials are randomized experiments that examine the effects of brief and focused environmental manipulations (i.e., intervention components; Howe et al., 2010). Microtrials are not designed to bring about full treatment effects, but rather to enhance specific proximal outcomes, social-emotional skill outcomes in our case (Howe et al., 2010; Leijten et al., 2015). These experiments can be used to assess if isolated intervention components bring about meaningful changes in children's social-emotional behavior in a realistic context, and are suitable to identify the essential components of (social-emotional skills) interventions.

The Emergence of Social Functioning

Components included in social-emotional skills interventions are designed to enhance specific parts of the process that determines children's social-emotional functioning (i.e., social-emotional competence). Social and emotional skills are not independent constructs, but rather, social-emotional functioning is sophisticatedly complex; it is an integrated whole with multiple determinants.

The social-emotional skills that contribute to social-emotional functioning can be clustered in various ways. The Collaborative for Academic, Social, and Emotional Learning (CASEL) identifies five core competencies: self-awareness, social awareness, self-management, relationship skills, and responsible decision making (CASEL, 2020; Weissberg et al., 2019). Denham (2005) offers a somewhat different categorization by clustering self-awareness, self-management, social awareness, and problem-solving under emotional competence skills. The model described by Denham (2005) puts emotional skills at the root of social-emotional competence together with relational skills. In this dissertation, however, we used the comprehensive model provided by Beauchamp and Anderson (2010) to understand social-emotional functioning. The socio-cognitive integration of abilities (SOCIAL) model (Figure 1) describes how social-emotional (dis)function emerges based on psychological, developmental, and neuroscience literature, integrating various previous conceptualizations of social-emotional functioning, such as the model by Crick and Dodge (1994) and Yeates and colleagues (2007). The SOCIAL model sets out from children's normal maturation, making it an appropriate model for this dissertation, as we approach intervention research from a preventive perspective.

Figure 1. *The SOCIAL model. Copyright © 2020 by the American Psychological Association. Reproduced with permission. M. H. Beauchamp, V. Anderson, Psychological Bulletin, 2010,* ***136****, 39-64.*



The SOCIAL model (Beauchamp & Anderson, 2010) illustrates that social-emotional competence emerges through an interaction between cognitive and affective factors, which encompasses non-social, general neurocognition as well as affective processes (i.e., social cognition). The cognitive function level reflects a child's current cognitive abilities, which divides into three higher-order domains: the attention-executive, communication, and socio-emotional domain. The attention-executive domain includes processes categorized as attentional control (e.g., self-monitoring), cognitive flexibility (e.g., working memory), and goal setting (e.g., planning). The communication domain, which includes verbal and non-verbal responses, plays a role in the expression and comprehension of social behavior. Finally, the socio-emotional domain reflects processes such as the perception of emotions, attribution of traits and intentions, and theory of mind. The interaction between these basic and higher-order socio-cognitive processes determines the expression of social-emotional behavior (i.e., social-emotional competence). For example, a factor such as poor self-regulation might inhibit the adequate interpretation of social cues on the socio-emotional level, but this may also be related to a deficit in theory of mind (Beauchamp & Anderson, 2010; Spence, 2003).

Even though it is not the focus of the present dissertation, it is important to mention that socio-cognitive processes interact with biological (i.e., brain structure/neural functioning), external, and internal factors, and these functions also interact with each other. The environment that children grow up in, as well as their temperament and personality, plays a role in the expression of social behavior (Beauchamp & Anderson, 2010). For example, research has shown that there is a relationship between childhood behavioral inhibition (i.e., an internal factor) and the expression of social anxiety (Clauss & Blackford, 2012). Another example is parental attachment (i.e., an external factor), which influences children's social behavior (Groh et al., 2014). These relationships are bidirectional. In other words, biological, external, and internal factors not only influence socio-cognitive functioning, but changes in socio-cognitive function also impact these biological, external, and internal factors (Beauchamp & Anderson, 2010).

The interaction of environmental, behavioral, cognitive, and affective factors determines our ability to adapt to social contexts; the adequate interaction of these factors enables individuals to form and maintain positive relationships with others (Beauchamp & Anderson, 2010). Social-emotional competence reflects the ability to thrive in the social environment and manifests as peer acceptance, friendship, popularity, adequate conflict resolution, positive self-concept, and assertion, amongst others (Stump et al., 2010). A disruption in the functions addressed using the SOCIAL model (Beauchamp & Anderson, 2010) can lead to acquisition and performance deficits of social skills (Gresham, 2015). Existing literature generally uses the term *social skills* as a collective noun, which can reflect processes at the cognitive functioning level (of the SOCIAL model) that are exhibited "well" (e.g., problem-solving) as well as a manifestation of social-emotional competence (e.g., cooperation with others). As a final remark on the operationalization of social-emotional competence, it is important to note that behaviors commonly viewed as undesirable (e.g., aggression) do not necessarily reflect an impairment of cognitive functions. Achieving innate needs and goals drive individuals into action, and the motivation underlying social behavior can differ from person to person (Ryan & Deci, 2017).

Focus of The Current Dissertation

As is clear from the SOCIAL model, multiple processes and functions work together to determine a child's success or failure in social interactions. Moreover, problems in social-emotional functions can manifest in different ways (i.e., aggression or social withdrawal; Beauchamp & Anderson, 2010). To understand which intervention components are effective in influencing all these "parts" of social-emotional functioning would require decades of research; it is beyond the scope of this dissertation to address all factors associated with or manifestations of social-emotional functioning. The research presented in this dissertation focused on components aimed at enhancing children's socio-cognitive functioning (which covers the attentional-executive, communication, and socio-emotional component of the SOCIAL model; Beauchamp & Anderson, 2010). We aimed our research efforts on several behaviors that are relevant for school-age children, which currently implemented social-emotional skills interventions frequently target: social anxiety, (low) self-esteem, and prosocial behavior. All three target behaviors are the product of interactions of socio-cognitive processes described in the SOCIAL model.
The current dissertation focused on the effects of preventive interventions (i.e., universal and selective interventions). With the knowledge that many mental health problems start around the age of 14 (Kessler et al., 2005) and that the promotion of mental health yields the most beneficial results when it takes place early in life (e.g., Sancassiani et al., 2015), it is highly relevant to implement preventive programs from an early age—already in childhood. Following Article 17 of the United Nations' Conventions on the Rights of the Child—which emphasizes that all children have a right to "*social, spiritual and moral well-being and physical and mental health.*" (The United Nations, 1989)—we may even view access to effective preventive intervention as a child's fundamental right.

Research has shown that the school context lends itself well for preventive intervention efforts, as children spend much of their time at school with their peers, making the school

an excellent location to identify children with emerging problem behavior and to offer children the opportunity to apply new-learned skills (Conley & Durlak, 2017). Therefore, this dissertation focused explicitly on school-based social-emotional skills interventions. Important to note too, is that this dissertation uses the terms *training* and *intervention* interchanging to describe the process that attempts to prevent or reduce a deficiency in skills related to social-emotional functioning, and mental health problems related to such deficits.

Outline of the Current Dissertation

The research presented in this dissertation set out to gain insight into the effective content-related components of interventions that aim to enhance children's social-emotional competence and counter or prevent the adverse outcomes of impaired social-emotional competence. Table 1 provides an overview of the studies included in this dissertation and their sample characteristics.

In the first part of the current dissertation, we synthesized the effects of previous studies on the effectiveness of social skills interventions. **Chapter two** presents a multilevel meta-analysis that related specific training components to the effects of social skills training programs for children and adolescents. The second part of this dissertation includes three chapters that present microtrial studies assessing the effects of components used frequently in social-emotional skills interventions. **Chapter three** examines the effectiveness of exposure and cognitive restructuring in children with elevated symptoms of social anxiety. **Chapter four** examines the effects of psychophysical exercises and cognitive restructuring exercises when aiming to enhance children's self-esteem. Both of these chapters evaluate selective interventions. **Chapter five** examines if an autonomy support component has an additive effect in a universal social-emotional skills intervention to increase prosocial behavior. The final chapter, **Chapter six**, provides a general discussion that integrates the findings from all the presented studies.

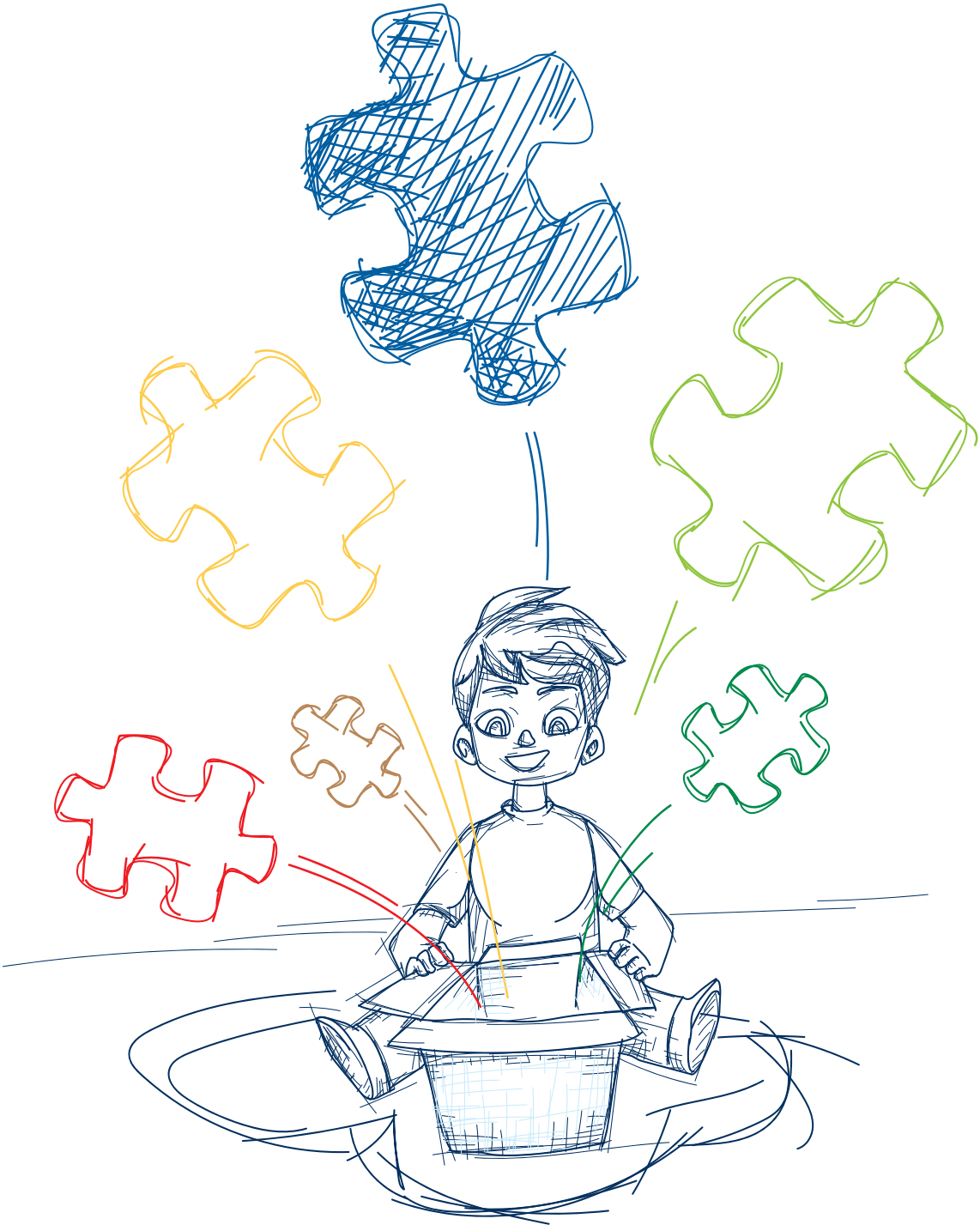
Table 1. *Overview of Dissertation Chapters: Research Questions, Level of Intervention, Research Method, and Sample Included.*

Chapter	Target behavior	Research question(s)	Level of intervention	Method	*N*	Age *M(SD)*	Girls %	Western[1] %
Section 1								
2.	Various	Which distinct training components are associated with social skills training program effects?	Universal & selective	Meta-analysis	71.226	3- 17 years[2]	-	-
Section 2								
3.	Social anxiety	(i) Are brief group interventions using exposure, cognitive restructuring, or a combination of both, effective in reducing social anxiety symptoms and related outcomes?; (ii) Is there a difference in effectiveness between the brief group interventions using exposure, cognitive restructuring, or a combination of both?	Selective	Microtrial	191	10.48 (1.10)	63.4	55.3
4.	Self-esteem	(i) Is a brief group intervention with psychophysical exercises effective in enhancing children's self-esteem?; 1 (ii) Is a brief group intervention with cognitive restructuring exercises effective in enhancing children's self-esteem?; (iii) Is there a difference in effectiveness between a brief group intervention with psychophysical exercises and a brief group intervention with cognitive restructuring exercises?	Selective	Microtrial	186	10.66 (1.01)	51.1	66.5
5.	Prosocial behavior	(i) Are brief classroom-based social skills interventions effective in improving children's prosocial behavior?; (ii) Is a brief classroom-based social-emotional skills intervention that includes an autonomy support component more effective in enhancing children's prosocial behavior compared to a brief classroom-based social-emotional skills intervention without an autonomy support component?	Universal	Microtrial	778	10.61 (0.93)	47.4	66.1

Note. [1]We defined children's ethnic origin following the definition of the Dutch Bureau for Statistics (n.d.).

[2]Children's age was not a moderator in the meta-analysis; thus, the mean age of the included sample is not available.

1



CHAPTER 2

Effective Components of Social Skills Training Programs for Children and Adolescents in Nonclinical Samples: A Multilevel Meta-Analysis

Brechtje de Mooij, Minne Fekkes, Ron H. J. Scholte, Geertjan Overbeek

Abstract

Social skills training (SST) programs for nonclinical children and adolescents are known to have positive effects on social skills, but it remains unclear how distinct training components are related to program effects. This multilevel meta-analysis examines how psychoeducation (i.e., exercises aimed at the transfer of knowledge), psychophysical components (i.e., physical exercises aimed at improving self-confidence and trust in others), skill-building components (i.e., exercises aimed at improving interpersonal skills), and cognitive-emotional components (i.e., exercises aimed at changing emotions and cognitions) are independently related to SST program effects. We extracted data from 97 articles describing 839 effect sizes. Training content data were extracted from 60 corresponding SST programs. Our results showed that SST programs had a positive effect on the development of interpersonal skills and emotional skills in nonclinical samples: d = .369, 95% CI [.292, .447], p < .001. This effect was positively influenced by the inclusion of psychoeducation and skill-building components. The inclusion of psychophysical components and the number of cognitive-emotional components did not influence program effects. For psychoeducation and skill-building components, we observed a curvilinear relationship between intensity and effect size: programs including three to six psychoeducational exercises yielded larger effect sizes compared to programs with more or fewer psychoeducational exercises, and programs with 11 to 20 skill-building exercises outperformed programs with more or fewer skill-building exercises. These findings are an indication that psychoeducational components and skill-building components are related to larger SST program effects, granted that the dosage is right.

Effective Components of Social Skills Training Programs for Children and Adolescents in Nonclinical Samples: A Multilevel Meta-Analysis

Shy and anxious children that are afraid of being laughed at by others are not fun playmates for their peers. These children may be excluded from activities, may become more socially withdrawn, and may even become the target of bullying behavior by others. On the other end of the spectrum are domineering, controlling children that become angry quickly, unable to regulate their impulses and emotions. These children are not fun playmates for their peers either and may also be at risk for marginalization in the peer context (Cook, Williams, Guerra, Kim, & Sadek, 2008). The two types of children described above behave in very different ways, but both have difficulty in conducting themselves appropriately in social interaction. A social skills deficit can be a risk factor for different adverse outcomes, such as peer rejection and depression (Segrin, 2000), antisocial problem behavior and delinquency (Ang, 2003), and academic failure (Malecki & Elliot, 2002).

Social skills can be viewed as a multidimensional construct that can be defined as learned behaviors that predict adaptive outcomes in social situations (Gresham & Elliot, 1987). Being socially skilled reflects the ability to perform a variety of social behaviors adequately, such as problem-solving, assertion, cooperation, attribution, communication, emotional sensitivity, and emotion regulation (Kavale & Forness, 1996; Spence, 2003). Having adaptive social skills is related to being perceived by others as socially competent (McCelland & Scalzo, 2006) and to higher peer acceptance (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000). Social skills contribute to an individual's ability to initiate and maintain positive social interactions. For example, children that can adequately solve a conflict with their peers are flexible in choosing how to react in social situations, which can decrease impulsiveness and frustration with others (Denham & Almeida, 1987).

Social skills training (SST) programs are those programs that aim to teach and improve children's appropriate, adaptive social behaviors. Over the past decades, many SST programs have been developed for both clinical and nonclinical target populations (e.g., Frey, Hirschstein, & Guzzo, 2015). These SST programs are generally multifaceted, stacking different training components, such as psychoeducation, skills training, and cognitive-behavioral exercises. Consequently, SST programs typically target multiple outcomes.
SST programs can be based on multiple theory-based approaches on how children learn social skills. Social learning theory holds that social behavior is learned by observing others (Bandura, 1978). Consequently, many SST program components focus on modeling, coaching, and shaping behavior (Ladd & Mize, 1983). The reinforcement theory posits that behavior, both positive and negative, is more likely to occur when a reward follows it. Based on this approach, several SST program components focus on improving children's social competence by directly and explicitly rewarding prosocial behavior (Skinner, 1953). Furthermore, the cognitive-behavioral approach highlights the importance of interpersonal cognitive problem-solving skills. This approach results in SST program components that focus on how to deal with others in alternative ways through means-end thinking (Denham & Almeida, 1987).

Despite having a common aim, SST programs vary widely in content, design, and target population (Diekstra, 2008). For example, a program can be embedded within the school curriculum or be self-contained, and can target specific behavior (e.g., bullying or social anxiety) or numerous different behaviors. Also, it can target children with clinical levels of behavioral problems, children at risk for behavioral problems, or children from the general population. SST programs also vary widely in their focus on stimulating either one specific skill or a combination of skills, including interpersonal problem-solving, more adequate processing of social information, adjusting cognitive distortions, increasing social knowledge, increasing self-regulation and the acquisition of an appropriate set of social behaviors (Spence, 2003).

The effectiveness of SST programs has been studied extensively, and several meta-analyses assessing the effects of SST programs in nonclinical and at-risk populations have been published. However, mixed findings have emerged regarding the effectiveness of SST programs on different outcomes. Previous meta-analyses have assessed universal prevention and intervention programs, and have generally shown positive effects on direct outcomes of SST for children and adolescents. SST programs have shown effect sizes on problem solving skills that range from d = .26 to .78, effect sizes for SST on self-esteem range from d = .16 to .69, effect sizes for SST on social competence range from d = .22 to .70, and effect sizes for SST on social behavior range from d = .24 to .92. Program effects on secondary outcomes are slightly smaller: effects on disruptive behavior and aggression range from d = .12 to .63 and d = .12 to .40, respectively (Denham & Almeida, 1987; Diekstra, 2008; Durlak, Weisberg, Dymnicki, Taylor, & Schellinger, 2011; Lösel & Beelmann, 2003; Reddy, Newman, De Thomas, & Chun, 2009; Schneider, 1992; Sklad, Diekstra, de Ritter, Ben, & Gravestijn, 2012; Taylor, Oberle, Durlak, & Weissberg, 2017)but training technique did not emerge as a significant predictor of outcome in the multiple regression analysis. Outcome varied considerably as a function of variable. Effect sizes were higher for indices of social competence (observed social interaction, peer- and self-report, social-cognitive skill.

Based on previous research, we know that SST programs work, but we do not know to what extent program effects depend on individual training components (Chorpita & Daleiden, 2009). Most of the SST programs included in meta-analytic studies combine different program components, which is why several scholars have compared these types of multifaceted training programs to cocktails (Leijten et al., 2015). Until now, research has predominantly focused on the cocktail as a whole; the effectiveness of individual training components has mostly gone untested. This hampers our insight into how distinct training components are related to program effects, limiting practitioners' ability to tailor SST programs to their client needs. Such knowledge about effective training components can be used to adjust existing SST programs to exclude components that do not stimulate positive child development, or that may even produce iatrogenic intervention effects (Dishion, McCord, & Poulin, 1999). Therefore, we conducted a meta-analysis to determine if and how distinct training components are related to SST program effects for children and adolescents in a nonclinical sample. This allowed us to investigate the specificity hypothesis described by Chorpita and Daleiden (2009), which proposes that specific components are related to intervention effects.

The Present Meta-Analysis

Using meta-analytic strategies, we are the first to examine the associations of distinct training components with effect sizes of SST programs. There were two reasons for our focus on a nonclinical target audience. First, SST programs are widely implemented in schools, mostly reaching children with light or just emerging problem behavior. The second reason was a practical one: as there is a wide variety of SST programs for different target populations, it was not feasible to include both clinical and nonclinical samples. This study was a first attempt to relate SST components to SST program effects, and therefore, we demarcated the scope of our meta-analysis.

We disassembled and coded 60 SST programs in terms of their distinct training components. These training components were then related to the effect sizes of 97 randomized controlled trials and controlled quasi-experimental studies using a multilevel approach. This enabled us to investigate whether specific training components of SST programs are related to larger or smaller effect sizes on primary and secondary outcomes. Evidence points to social skills deficits underlying the development of problem behavior (e.g., Spence, 2003). Therefore, the main analyses of this study are focused on the effects of SST programs on the primary outcomes of interpersonal and emotional skills. For nonclinical samples, these are the outcomes that are most directly targeted in SST programs. Effectively targeting interpersonal and emotional skills in SST programs should prevent the development of more serious problem behaviors. Therefore, we assessed SST program effects on problem behavior outcomes in the secondary analyses.

This meta-analysis is the first scientific endeavor to connect distinct training components to the effects of SST programs for nonclinical children and adolescents and is thus exploratory in nature. Following the specificity hypothesis, we expected that SST training components would be differently associated with SST program effects. However, we did not formulate a specific hypothesis about which training components would be more or less effective.

Method

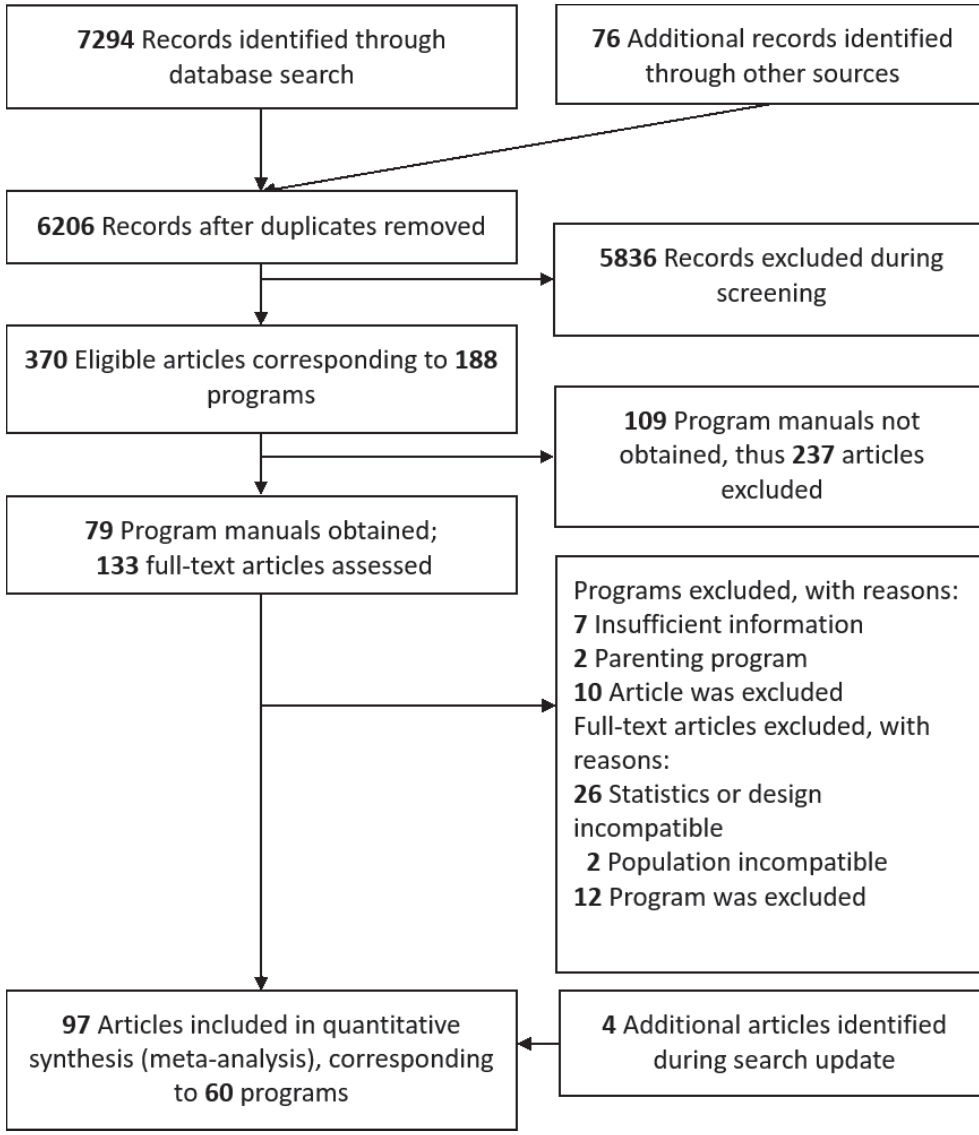
For this study, we followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses guidelines (Moher et al., 2009) and the guidelines issued by the American Psychological Association (2010). Figure 1 provides an overview of the flow of information through the different phases of our study.

Information Sources

The electronic search was conducted in multiple databases: PsychINFO, ERIC, Medline, Scopus, and Google Scholar. The search filter consisted of five elements containing key terms for 1) the primary focus of the study, 2) the secondary focus of the study, 3) the type of training, 4) the target audience, and 5) the type of study. The element for the primary

focus of the study contained the search words: social skills, social skills training, social*, socio*, interpersonal, intrapersonal, skills, interpersonal competenc*, intrapersonal competenc*, social competenc*, soci* emotional learning, and peer relations. The element for the secondary focus of the study contained the search words: assertiveness, test anxiety, performance anxiety, emotional control, anger control, prosocial behavior, assertive*, coping strateg*, resilience, and prosocial. The full search string is available in Appendix A.

Figure 1. *PRISMA Flowchart of the Study and Program Selection Process.*



Selection of Studies

Data collection was twofold as data were obtained from both published studies and program manuals. The selection of the articles, as well as the retrieval of the program manuals, was executed following a prewritten protocol. This protocol is available in Appendix B.

We defined "SST program" as a program aimed at teaching or developing children's adaptive social behavior to improve their success in social interactions. Studies eligible for review i) assessed the effectiveness of an SST program for school-age children and adolescents up to 18 years of age; ii) assessed an SST program that targets a sub-clinical population; iii) had a pre-test post-test design with a control group; iv) reported at least one social skill outcome; v) provided sufficient statistics to calculate a Cohen's *d* effect size; vi) were written in English or Dutch; vii) were peer-reviewed and viii) were published from January 1, 1990, onwards. We did not include studies published before 1990 to ensure that SST program manuals would still be available and the included studies reflected relatively recent evidence for SST program effectiveness.

We excluded studies if the training assessed was a parenting program aimed at changing children's behavior by teaching parents how to discipline or interact with their children. Programs and studies that focused on children's or adolescents' physical health (e.g., prevention of drug use, AIDS, pregnancy, etc.) were also excluded. Moreover, programs focusing on preschool-aged children were excluded, as well as studies that assessed SST programs in children with attention deficit hyperactivity disorder (ADHD), autism, or clinical levels of internalizing or externalizing behavior. We did not formulate criteria concerning the SST program setting or type. Thus school-based and community-based programs as well as universal and indicated SST programs were eligible for this study.

Selection of Training Programs

In total, 6206 eligible records were obtained. The titles and abstracts of all of these records were screened for inclusion criteria. Based on our exclusion criteria (see above, "Selection of Studies" paragraph), 5836 of the 6206 records were excluded in the identification phase. The remaining 370 eligible articles met our inclusion criteria based on the screening of the title and abstract. These articles corresponded to 188 SST programs. Efforts to obtain program manuals started in September 2016. Both the study authors and program developers of the 188 eligible SST programs were contacted to request a copy of the program manual. We could not obtain a copy of 109 programs, which resulted in the exclusion of 237 articles. Efforts to obtain program manuals ended May 31, 2017. By this time, the manuals of 79 SST programs had been collected.

The 79 SST programs corresponded to 133 articles, of which the full-text was assessed in the eligibility phase of our study. After reading the complete articles, another 28 articles were excluded due to a lack of statistics, or the design or population not meeting our inclusion criteria. The 10 SST program manuals that corresponded to these articles were, therefore, also excluded. After a full inspection of the manuals, nine SST programs were excluded. Seven of these programs did not provide enough information in the

program manual to allow for reliable coding of the exercises. The two other programs were excluded because they focused on parents instead of children. The 12 articles that corresponded to these excluded SST programs were consequently also excluded from our study. Our search was updated in October 2018, adding four studies that described previously coded SST programs. Ultimately, 60 unique SST programs were included. These SST programs were evaluated in 97 articles that reported on N = 71,226 participants between 3 and 17 years old. We extracted a total of 839 effect sizes from the included studies (see Figure 1 for the full study flowchart; Liberati et al., 2009). Appendix C provides references for the included studies.

Of the included training programs, 19 were social-emotional learning (SEL) programs. Other programs targeted more specific behavior: six programs targeted bullying behavior, ten programs targeted (social) anxiety, 11 programs targeted disruptive behavior, five programs targeted resilience and self-esteem, and nine programs targeted prosocial interactions. Appendix D, Table D.1, provides an overview of the included programs and studies.

Data Extraction and Coding

After all eligible studies and corresponding program manuals were collected, data were coded using two separate coding systems, one for coding the studies and one for coding the program manuals. We did not require SST programs to be available in English or Dutch, because we did not want to exclude possibly effective programs that were not (yet) translated into English from our study. If program developers or authors consented to share the program manual with us, but the program manual was not available in English or Dutch, all exercises included in the program were discussed during a Skype meeting. In these Skype meetings, we used the coding system as a guide to the semi-structured interview and asked program developers or authors to explain every exercise of the program, which allowed us to code the program from the information provided verbally. In this way, we safeguarded the reliability of the coding process and made sure that all included programs were scored on the same criteria. Six programs were coded this way.

To code the program manuals, we developed a taxonomy based on a previous taxonomy by Veerman, Spanjaard, and van Yperen (2015), supplemented with components from other international taxonomies (Chorpita & Daleiden, 2009; Michie et al., 2013). All exercises of the program were categorized into one of four main training component categories or the booster component category. All categories of training components included subcategories, and these included up to eight training subcategories each.

The first of the main training component categories is *Psychoeducation*, which included all exercises that are aimed at transferring knowledge about behavior or group processes and social roles. The second category is *Psychophysical components,* which included physical relaxation exercises, physical exercises to improve posture, physical exercises aimed at boosting self-confidence and physical exercises aimed at promoting trust in others. The third category *Skill-building components* included exercises in verbal and non-verbal communication, teamwork exercises, exercises to promote and practice prosocial

behavior, and exercises to improve problem-solving. The fourth category *Cognitive-emotional components* included exercises to enlarge self-awareness, exercises to practice recognizing one's own and others' emotions, exercises to improve impulse regulation, cognitive restructuring exercises, and mindfulness exercises. Finally, the category *Booster components* included program units aimed at class management, rewarding of behavior, behavioral contracting, generalization to situations transcending the training, coaching, and (self-)monitoring behavior. The individual exercises were coded to belong to one of the five component categories exclusively. To assess the dosage with which the different components were implemented, we calculated the number of exercises per component category. Appendix D, Table D.2, provides an overview of the individual training components used in the featured SST programs.

Additionally, characteristics of the SST program were coded. We coded whether a program was universal (targets general population) or indicated (targets children with emerging behavioral problems), the duration of the program (in weeks), the type of trainer (school personnel, mental health professional or non-school personnel), the mode of delivery (computer program or face-to-face), and the age of participants (primary school age, secondary school age or both children and adolescents). If needed, this information was supplemented with information provided in the corresponding studies.

We also coded several study characteristics: bibliographic information (e.g., authors, journal of publication, year of publication, and location of study), sample size, the time between pre-test and first reported post-test (less than six months, six to 12 months, 13 months to two years, or more than two years) and the informant per effect size (self-report, behavior rating by others or behavioral observation). The quality of the study was assessed using the Quality Assessment Tool For Quantitative Studies (QATQS). The QATQS is a widely used, reliable tool to assess the quality of a study based on selection bias, study design, possible confounders, blinding, data collection methods, and withdrawals and dropouts. Each section is rated on a three-point scale (weak, moderate, or strong). The global rating for a study is determined by assessing the rating of the five sections. A study was rated as strong if there were no weak ratings on any of the domains. A study was considered moderate if a weak rating was assigned to one of the domains, and a study was considered weak when two or more domains were rated weak (Effective Public Health Practice Project, 1998; Thomas, Ciliska, Dobbins, & Micucci, 2004).

The first author trained research assistants to code studies and program manuals. The coding schemes were discussed extensively, and research assistants practiced coding a program manual that was not included in the final meta-analysis. The training was completed when there was sufficient agreement between coders. Ten studies were double coded by the first author and research assistants (10% of the total number of studies) to determine inter-rater agreement. Intraclass correlations (ICC) ranged between .664 and 1.00. For the manuals, inter-rater agreement was based on double coding of six program manuals (10% of the total number of manuals), and there was an agreement of 72.3% between raters (ICC = .684). The disagreement between raters could mostly be attributed to difficulty distinguishing psychoeducational exercises aimed at the transfer of knowledge only and psychoeducational introductions to other components—which often include

a short introduction of behavior followed by an opportunity to practice. Disregarding all exercises coded as psychoeducational by either rater, the inter-rater agreement was 86% (ICC = .920). All disagreements between raters were reevaluated and solved through mutual discussion. Exercise codes were corrected for subsequent analyses.

Calculation of Effect Sizes

Only the effects of SST programs from pre-test to the first reported post-test were included in the current meta-analysis because not all of the included studies presented follow-up data. Raw data (means and standard deviations) were converted into Cohen's *d* values by calculating the mean difference between pre-test and first reported post-test of the experimental and control group, and dividing by the pooled standard deviation of the experimental and control group at pre-test (eq. 8, Morris, 2008). We used the pooled standard deviation to estimate the sampling variance more accurately, and the estimated effect size was adjusted according to sample size (eq. 10, Morris, 2008).

When raw data were not sufficiently reported, alternative statistics were used to calculate the effect size, such as F-test, t-test, Mann Whitney U, Odds Ratio, or regression coefficients. If a result was not significant, and consequently, statistics were not presented in an article, an effect size of zero was coded (Durlak & Lipsey, 1991). Effect sizes were coded in such a manner that a positive effect size reflected a positive behavioral change (e.g., increase of social skills), and a negative effect size reflects a negative behavioral change (e.g., a decrease of self-control).

Relevant effect sizes were categorized by the outcome domain. The first two categories, interpersonal and emotional skills, reflected outcomes at the core of the construct social skills. *Interpersonal skills* included outcomes reflecting problem-solving, coping, social skills, assertiveness, and social competence. *Emotional skills* included outcomes reflecting self-efficacy, self-awareness, self-esteem, empathy, emotion regulation, and emotion knowledge. We also coded more distal outcomes, as these outcomes can be viewed as proxies for social skills deficits. The category *Peer relationship problems* included outcomes reflecting victimization and bullying perpetration. *Internalizing problem behavior* included outcomes reflecting depression, loneliness, and (social) anxiety, and *Externalizing problem behavior* included outcomes reflecting aggression, conduct problems, attention problems, and hyperactivity.

Statistical Analyses

Preparations for analyses included centering continuous variables on the mean and recoding categorical variables into dummies. Effect sizes were checked for outliers by screening for z-scores higher than 3.29 or lower than -3.29. Effect sizes exceeding these z-scores were manually brought back to the highest value within a z-score of ±3.29 (Tabachnik & Fidell, 2007).

The random-effects multilevel analyses were conducted using the metafor-package (Viechtbauer, 2010) in R (version 3.3.4). The advantage of using a random-effects model over a fixed-effects model is that it takes into account that observed effect sizes might vary from true effect sizes due to external factors. The advantage of the multilevel approach over a traditional univariate approach is that all relevant outcomes can be included in the analysis, without the need to aggregate effect sizes per study. The multilevel approach thus preserves information while achieving maximum power. The multilevel approach accounts for the nesting of effect sizes within studies (van den Noortgate & Onghena, 2003). This is important because studies on the effects of SST programs vary broadly in design and hence are not homogeneous. We accounted for the uncertainty in estimating residual heterogeneity by applying the Knapp and Hartung (2003) adjustment, which reduces Type I error.

First, we estimated the overall effect of SST programs on the separate outcome domains using random three-level univariate models (for a step-by-step tutorial, see Assink & Wibbelink, 2016). For the subsequent analyses, we used a subset containing the effect sizes for interpersonal and emotional skills only, since these were considered the proximal outcomes. We examined the overall effect of SST programs for these two outcome domains together, and we assessed whether programs' inclusion of distinct training components was associated with stronger effects for SST programs on these proximal outcomes. A significant Q-test of heterogeneity indicates that a component significantly influences the overall effect size (Borenstein, Hedges, Higgins, & Rothstein, 2009a). In this phase of the analyses, we also examined if the total amount of exercises focused on the specific training components was associated with stronger effects for SST programs. Both continuous and categorical variables were included in the analyses as moderators. The categorical variable for the total amount of exercises was formed based on the distribution of the continuous variable, in such a manner that each category of the variable included approximately 20 percent of the effect sizes. The mean estimated effect sizes per category of the dosage variable were compared to each other, to assess whether significant differences were present between the subgroups formed for the total amount of exercises per component category. Third, the moderating effect of booster components (i.e., the use of rewards, goal setting, generalization, coaching, and self-monitoring) was assessed. Then, we assessed if the coded program characteristics and research design characteristics were significant moderators of SST program effects.

We used the PET-PEESE approach to assess publication bias (Stanley & Doucouliagos, 2014). This approach uses a meta-regression based model. The first step of this approach is the precision-effect test (PET), which is based on Egger's test and uses the standard error as a moderator of effect size. This test examines whether there is a true effect beyond publication bias; a significant moderator effect of the standard errors implies the presence of publication bias. When the intercept in the PET model is significant, a precision-effect estimate with standard error (PEESE) test is assessed. This test uses the variance of effect sizes as a moderator of effect size. In this second step, a significant variance of the effect size with the standard error implies publication bias (Stanley & Doucouliagos, 2014). Additionally, we examined the symmetry of a funnel plot. An asymmetrical funnel plot indicates bias (Borenstein, Hedges, Higgins, & Rothstein, 2009b).

In secondary analyses, the influence of training components was separately assessed for peer relationship problems, internalizing behavior problems, and externalizing problem behavior. For these secondary analyses, we also estimated mean effect sizes by type of SST programs for each different secondary outcome domain.

Results

Effects of Individual Training Components on Interpersonal and Emotional Skills

SST programs yielded significant, small overall effects on all outcome domains. The largest effects were found for interpersonal and emotional skills (Table 1). As SST programs target interpersonal and emotional skills directly, and problem behavior outcomes are assessed as a proxy for improvements in interpersonal and emotional skills, our primary analyses focused on SST component effects on interpersonal and emotional skills. These analyses were based on data from 49 SST programs and $k = 77$ studies that reported on a total of 369 effect sizes. A random three-level meta-analysis yielded a significant, small overall SST program effect on interpersonal and emotional skills: $d = .369$, 95% CI [.292, .447], $p < .001$ (Durlak, 2009). This effect translates to an average percentile gain of 13 percent on interpersonal and emotional skills following an SST (Coe, 2002; McCartney & Rosenthal, 2000). The analyses also demonstrated that there was significant heterogeneity in the effects of SST programs on interpersonal and emotional skills. Specifically, log-likelihood tests showed significant variance between effect sizes within studies ($\sigma^2_{level\ 2} = .053$; $\chi^2 = 873.000$, $p < .001$) and between studies ($\sigma^2_{level\ 3} = .098$; $\chi^2 = 111.951$, $p < .001$). About four percent of the total variance could be attributed to within-study sampling variance (level 1), about 34 percent to differences between effect sizes within studies (level 2), and about 62 percent to differences between studies (level 3).

Table 1. *The Effect of SST Programs on the Different Outcome Domains, and Heterogeneity Between and Within Studies.*

Outcome measures	# *p*	# *k*	# *ES*	Mean *d*	95% CI	*p*	$\sigma^2_{level\ 2}$	$\sigma^2_{level\ 3}$
Interpersonal skills	42	68	239	.386	.288 - .484	< .001	.068***	.136***
Emotional skills	26	38	130	.328	.225 - .431	< .001	.007***	.098***
Peer relationship problems	19	27	56	.255	.095 - .415	.002	.063***	.133***
Internalizing problem behavior	35	52	182	.233	.159 - .306	< .001	.028***	.047***
Externalizing problem behavior	39	60	232	.172	.078 - .266	< .001	.022***	.127***

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Mean *d* = mean effect size (*d*); 95% CI = confidence interval; $\sigma^2_{level\ 2}$ = variance within studies; $\sigma^2_{level\ 3}$ = variance between studies.
**p* < .05, ***p* < .01, ****p* < .001.

We assessed if individual training components were related to the SST program effect sizes (Table 2). The inclusion of psychophysical components was not associated with

stronger effects of SST programs on interpersonal and emotional skills. The effects of SST programs were not moderated by the total number of included psychophysical exercises either. Whether the inclusion of cognitive-emotional components was related to SST program effects could not be assessed, as only one included SST program did not include any cognitive-emotional exercises, and therefore, an adequate comparison could not be made. Assessment of the total amount of cognitive-emotional components included in an SST program showed that this was not a significant moderator of SST program effects.

The inclusion of psychoeducation was significantly related to the effectiveness of SST programs on interpersonal and emotional skills. SST programs that included psychoeducation yielded a significantly larger estimated effect compared to programs that did not include this component, $\beta = .234$, $p < .05$. We did not find a linear association between the total number of psychoeducational exercises and SST program effects. Therefore, we performed a category comparison, which showed that programs with three to six psychoeducational exercises yielded a significantly larger estimated effect size, $F(1, 364) = 3.893$, $p < .05$, $d = .538$, $p < .001$, compared to programs not in this category, $d = .325$, $p < .001$, $\beta = -.213$, $p < .05$. In other words, there was a curvilinear relation, programs with three to six psychoeducational exercises outperformed programs with fewer as well as more psychoeducational exercises.

At first sight, the inclusion of the skill-building component did not appear to influence the effects of SST programs on interpersonal and emotional skills. However, a category comparison on the number of skill-building exercises showed that SST programs containing 11 to 20 exercises aimed at this component yielded a significantly larger estimated effect size, $F(1, 351) = 5.152$ $p < .05$, $d = .497$, $p < .001$, compared to programs not in this category, $d = .305$, $p < .001$, $\beta = -.193$, $p < .05$. Programs containing 11 to 20 skill-building exercises outperformed programs with fewer as well as more skill-building exercises.

Table 2. *Results of Moderator Analyses of Training Components on Interpersonal and Emotional Skills Using a Three-way Univariate Model.*

Moderator	Category	*# p*	*# k*	*# ES*	Estimate	95% CI	Q	*p*
Psychoeducation	Not included in the program	10	14	96	.181*	.014 - .348	*F* (1, 367) = 6.026	.015
	Included in the program	39	63	273	.415***	.331 - .499		
Total number of exercises	None	10	14	96	.181*	.017 - .345	*F* (4, 361) = 2.253	.063
	1 – 2 exercises	10	14	61	.421***	.238 - .604		
	3 – 6 exercises	10	15	39	.537***	.344 - .729		
	7 – 14 exercises	9	12	79	.408***	.240 - .575		
	15 > exercises	10	20	91	.312***	.168 - .455		

Moderator	Category	# *p*	# *k*	# *ES*	Estimate	95% CI	Q	*p*
Psychophysical components	Not included in the program	20	57	151	.388***	.275 - .501	*F* (1, 367) = .187	.655
	Included in the program	29	20	218	.353***	.246 - .461		
Total number of exercises	None	21	37	151	.387***	.275 - .499	*F* (3, 357) = .574	.633
	1 exercise	12	19	94	.399***	.240 - .559		
	2 – 4 exercises	11	15	48	.328***	.141 - .516		
	5 > exercises	3	3	68	.215	-.050 - .480		
Skill-building components	Not included in the program	3	3	7	.314	-.110 - .739	*F* (1, 367) = .068	.794
	Included in the program	46	74	362	.372***	.292 - .451		
Total number of exercises	None	3	3	7	.314	-.104 - .732	*F* (4, 348) = 1.448	.218
	1 – 10 exercises	13	17	107	.282***	.125 - .439		
	11 – 20 exercises	15	23	102	.499***	.359 - .639		
	21 – 30 exercises	9	20	89	.284***	.127 - .440		
	30 > exercises	6	8	48	.393***	.172 - .613		
Cognitive-emotional components	Not included in the program	1	1	1	-	-	-	-
	Included in the program	48	76	368	-	-		
Total number of exercises	None	1	1	1	.259	-.568 – 1.087	*F* (5, 347) = .312	.905
	1 – 5 exercises	9	12	103	.376***	.191 - .560		
	6 – 10 exercises	12	13	66	.447***	.261 - .633		
	11 – 15 exercises	7	10	28	.407**	.157 - .657		
	16 – 20 exercises	9	17	79	.362***	.202 - .522		
	21 > exercises	8	18	76	.299***	.135 - .463		

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Finally, we assessed if the inclusion of booster components accounted for variance in effect sizes. None of the booster components (i.e., class management, generalization, rewarding of behavior, coaching, goal setting, and [self-]monitoring) were significantly related to SST program effects on interpersonal- and emotion skills (Table 3). Thus, these booster components do not independently influence SST program effects. Also, none of the variables for the dosage of booster components were significant.

Program Characteristics

Table 4 presents all the results for the moderator analyses with SST program characteristics. Indicated SST program effects on interpersonal and emotional skills were not significantly different from universal SST program effects. Furthermore, there was no linear relation between program duration and program effects. However, a category comparison showed that SST programs of 27 weeks or more were found to have a significantly smaller estimated effect on interpersonal and emotion skills F (1, 361) = 4.567, $p < .05$, $d = .208$, $p < .001$ compared to programs of 10 to 11 weeks, $\beta = -.244$, $p < .05$, and programs of 12 to 16 weeks, $\beta = -.302$, $p < .05$.

Moreover, the type of trainer providing the program did not influence SST program effects on interpersonal and emotional skills. Noteworthy, however, is that the mean effect size of SST programs provided by non-school personnel (e.g., research staff or students) was not significant, whereas the mean effect size of SST programs provided by mental health professionals or school personnel was significant. It made no difference if a program required a pre-intervention training of certification for trainers. Furthermore, computer programs and face-to-face programs both yielded equally positive results, and the age of the participants did not influence SST effects either. These results are presented in Table 4.

Table 3. *Results of Moderator Analyses of Booster Components on Interpersonal and Emotional Skills Using a Three-way Univariate Model.*

Moderator	Category	# *p*	# *k*	# *ES*	Estimate	95% CI	Q	*p*
Class management	Not included in the program	4	8	34	.322*	.069 - .575	*F* (1, 367) = .155	.694
	Included in the program	45	69	335	.375***	.293 - .457		
Total number of exercises		46	69	353	.370***	.291 - .450	F (1, 351) = 1.436	.232
Rewarding	Not included in the program	30	52	229	.404***	.310 – .497	*F* (1, 367) = 1.687	.195
	Included in the program	19	25	140	.295***	.159 - .431		
Total number of exercises		47	74	361	.364***	.286 - .443	F (1, 359) = .281	.596
Goal setting	Not included in the program	36	62	263	.379***	.291 - .468	*F* (1, 367) = .213	.644
	Included in the program	13	15	106	.335***	.170 - .501		
Total number of exercises		48	76	364	.368***	.288 - .447	F (1, 362) = .878	.349
Generalization	Not included in the program	15	26	115	.374***	.234 - .513	*F* (1, 367) = .004	.948
	Included in the program	34	51	254	.368***	.274 - .462		
Total number of exercises		47	74	361	.371***	.293 - .451	F (1, 359) = 1.962	.162
Coaching	Not included in the program	12	16	78	.377***	.214 - .539	*F* (1, 369) = .010	.922
	Included in the program	37	61	291	.368***	.279 - .457		
Total number of exercises		47	72	357	.382***	.296 - .468	F (1, 355) = .001	.971

Moderator	Category	# p	# k	# ES	Estimate	95% CI	Q	p
Total number of exercises		46	71	353	.370***	.290 - .450	F (1, 351) = 1.169	.280
(Self-)monitoring	Not included in the program	36	61	326	.383***	.296 - .471	*F* (1, 367) = .464	.496
	Included in the program	13	16	43	.316***	.141 - .490		
Total number of exercises		47	72	357	.382***	.296 - .468	F (1, 355) = .001	.971

Note. # p = number of SST programs; *# k* = number of studies; *# ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. *Results of Moderator Analyses of Program Characteristics for the Effect of SST Programs on Interpersonal and Emotional Skills Using a Three-way Univariate Model.*

Moderator	Category	# p	# k	# ES	Estimate	95% CI	Q	p
Setting	Universal program	37	64	325	.372***	.288 - .457	*F* (1, 367) = .022	.883
	Indicated program	12	13	44	.356**	.155 - .556		
Duration of the program	1 – 9 weeks	9	11	94	.275**	.091 - .460	*F* (4, 358) = 2.033	.089
	10 – 11 weeks	14	21	94	.452***	.313 - .592		
	12 – 16 weeks	8	13	36	.510***	.312 - .708		
	17 – 26 weeks	8	14	77	.376***	.199 - .552		
	27 > weeks	7	15	62	.208*	.046 - .370		
Type of trainer	School personnel	33	56	299	.343***	.255 - .431	*F* (2, 359) = .351	.704
	Mental health professional	13	15	56	.426***	.246 - .605		
	Non-school personnel	3	3	7	.403	-.008 - .813		
Schooling required for trainer	Yes	29	51	254	.377***	.281 - .473	*F* (2, 366) = .221	.802
	No	12	16	76	.390***	.217 - .564		
	Not specified	8	10	39	.305**	.093 - .516		
Mode of delivery	Computer program	3	3	6	.525*	.079 - .972	*F* (1, 367) = .485	.487
	Face-to-face	46	74	363	.365***	.286 - .444		
Age of participants	Primary school age	31	50	268	.391***	.295 - .486	*F* (2, 366) = .573	.565
	Secondary school age	7	7	21	.428**	.136 - .720		
	Children and adolescents	11	20	80	.298**	.142 - .455		

Note. # p = number of SST programs; *# k* = number of studies; *# ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Robustness of Main Findings

Research Design Characteristics

Analyses showed that the quality of the study significantly influenced the estimated mean effect of SST programs on interpersonal and emotional skills, F (2, 366) = 9.243, p < .001. Studies of moderate and strong quality yielded smaller effects, d = .455, p < .001 and d = .167, p < .01 respectively, compared to studies of weak quality, d = .534, p < .001. Also, the sample size of a study significantly influenced the estimated mean effect size,

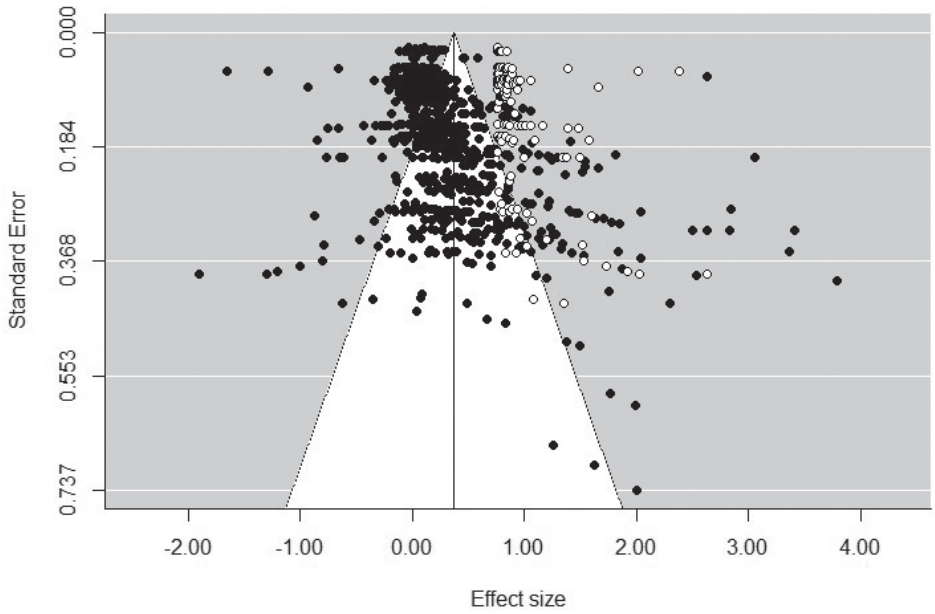
F (2, 367) = 9.464, p < .01. As the sample size of a study increased, the estimated mean effect of SST programs decreased, d = .431, p < .001, β = -.0001, p < .01. The time between pre-test and first reported post-test and the type of informant were not significant moderators of the effect of SST programs on interpersonal and emotional skills, F (2, 361) = 1.397,

p = .243 and F (2, 354) = .886, p = .413 respectively. See Appendix E, Table E.1 for the full results.

Publication Bias

Publication bias was assessed using the PET-PEESE method (Stanley & Doucouliagos, 2014). The PET result showed that the standard error of effect sizes was a significant moderator of the effect size. As the intercept in the PET model was significant, the PEESE model was also assessed. The PEESE model, which includes variance as a moderator, was significant, and this implies publication bias. A funnel plot with the effect sizes on the X-axis and the standard error of effect sizes on the Y-axis (Figure 2) shows that there is missing data on the right side of the funnel. This means that there are relatively few studies with larger sample sizes that report large positive effects (Duval & Tweedie, 2000).

Figure 2. *Funnel Plot.*



Outliers

Fifteen effect sizes were considered outliers (z-score exceeded ±3.29). Outliers were manually adjusted to values within a z-score of ±3.29 (d = -1.30 and d = 2.04 respectively). To assess whether this adjustment changed the results, we repeated the analysis of the overall effect with the unadjusted effect sizes. The overall estimated effect with unadjusted effect sizes was d = .383, 95% CI [.300, .466], p < .001, which is comparable to the effect originally estimated with the adjusted effect sizes, d = .369.

Secondary Analyses: Effects of Individual Training Components on Internalizing and Externalizing Behavior and Peer Relationship Problems

In a set of secondary analyses, we assessed whether individual training components moderated the effects on secondary outcome measures. As only one included SST program did not include a cognitive-emotional component, this component category was not considered in the secondary analyses. SST program effects on peer relationship problems were not significantly associated with the inclusion of psychoeducation in the program, F (1, 54) = .248, p = .558, psychophysical components, F (1, 54) = .850, p = .361, or skill-building components, F (1, 54) = .009, p = .924. SST program effects on internalizing problem behavior were not significantly associated with the inclusion of psychoeducation, F (1, 180) = .158, p = .691, psychophysical components, F (1, 180) = .080, p = .778, or skill-building components, F (1, 180) = 2.162, p = .143. Finally, SST program effects on externalizing problem behavior were also not associated with the inclusion of psychoeducation, F (1, 230) = .548, p = .460, psychophysical components, F (1, 230) = .825, p = .365, or skill-building components, F (1, 230) = .097, p = .756. The results of these analyses are presented in Appendix F to H.

We assessed the mean estimated effect size per outcome domain (i.e., interpersonal skills, emotion skills, peer relationship problems, internalizing problem behavior and externalizing problem behavior) for the types of SST programs separately (Appendix I, Table I.1). The analyses showed that SEL programs had a significant, positive effect on interpersonal skills, d = .290, 95% CI [.187, .393], p < .001, emotional skills, d = .249, 95% CI [.142, .355], p < .001, and internalizing behavior problems, d = .128, 95% CI [.065, .191], p < .001. SEL programs did not have a significant effect on peer relationship problems, d = .171, 95% CI [.000, .342], p = .050, or externalizing problem behavior, d = .095, 95% CI [-.007, .197], p = .067. Programs that target (social) anxiety were effective in increasing emotional skills, d = .264, 95% CI [.082, .447], p < .05, and decreasing internalizing behavior problems, d = .384, 95% CI [.134, .634], p < .01, but not in increasing interpersonal skills, d = .259, 95% CI [-.248, .766], p = .203, or decreasing externalizing behavior problems, d = .402, 95% CI [-1.852, 2.692], p = .256. Programs that target resilience and self-esteem were only effective in increasing emotional skills, d = .287, 95% CI [.015, .559], p < .05, and decreasing internalizing problem behavior, d = .112, 95% CI [.046, .178], p < .01, but not in increasing interpersonal skills, d = -.006, 95% CI [-.094, .083], p = .893, or decreasing externalizing problem behavior, d = .165, 95% CI [-.795, 1.125], p = .273. Interestingly, anti-bullying programs showed the largest effects on emotional skills, d = .864, 95% CI [.742, .987], p < .001, but were not effective in reducing peer relationship problems, d = .666, 95% CI [-.010, .1.342], p = .053. Anti-bullying programs

were also effective in increasing interpersonal skills, d = .709, 95% CI [.367, 1.050], p < .001, and decreasing internalizing and externalizing problem behavior, d = .846, 95% CI [.583, 1.110], p < .001 and d = .774, 95% CI [.099, .1.448], p < .05 respectively. Programs that target prosocial behavior only had a significant, positive effect on interpersonal skills, d = .660, 95% CI [.273, 1.048], p < .01, and internalizing behavior problems, d = .198, 95% CI [.028, .369], p < .05. Programs aimed at reducing disruptive behavior were effective in increasing interpersonal skills, d = .253, 95% CI [.127, .378], p < .001, reducing internalizing behavior, d = .348, 95% CI [.092, .603], p < .05, and reducing externalizing behavior, d = .245, 95% CI [.086, .405], p < .01. These programs were not effective in improving emotional skills, d = .494, 95% CI [-.316, 1.304], p = .166, or reducing peer relationship problems, d = .219, 95% CI [-.740, 1.179], p = .429.

Discussion

Previous meta-analyses have reported on the general effectiveness of SST programs, but have not assessed if distinct training components can be related to SST program effects. The present meta-analysis related individual training components from as many as 60 SST programs to 839 effect sizes using a multilevel meta-analysis approach.

Our main focus was on the effects of SST programs on interpersonal and emotional skills in nonclinical children and adolescents, as a deficit in these outcomes can be considered a risk factor for problem behavior. Our findings demonstrate that SST programs have a significant, small positive effect on children's and adolescents' interpersonal and emotional skills. Next, we assessed whether the inclusion of specific training components was related to larger SST program effects on interpersonal and emotional skills. These analyses demonstrated that SST programs yield larger effects when psychoeducational exercises are included in the program. This finding indicates that it is necessary to educate children and adolescents on the skills SST programs aim to develop to increase the effect of SST programs on interpersonal and emotional skills. Notably, the inclusion of psychoeducational exercises had a curvilinear effect on SST program effects, whereby the strongest effects were found when three to six psychoeducational exercises were included in the program. A similar curvilinear effect was found for the number of skill-building exercises included in SST programs. The inclusion of 10 to 20 skill-building exercises was related to larger program effects on interpersonal and emotional skills, whereas the inclusion of more or fewer skill-building exercises seemed to hamper SST program effects. For the other two components (i.e., psychophysical components and cognitive-emotional components), we did not find an effect for the overall inclusion of the components nor a curvilinear effect for a specific number of exercises. None of the booster components were associated with larger SST program effects on interpersonal and emotional skills.

Programs that lasted more than 27 weeks yielded inferior results compared to programs of 10 to 16 weeks, which could indicate that the duration of an SST program is related to program effects. There might also be a curvilinear relationship between the duration of SST programs and their effects on children's and adolescents' interpersonal and

emotional skills. After a certain point, more time spent on a program does not lead to superior results. The effectiveness of longer programs may be impaired by a difficulty to adhere to a protocol for an extended time (Lane, Bocian, MacMillan, & Gresham, 2010). We could not assess whether this explanation holds true, however, because most studies did not report on the implementation quality of the SST programs, and thus this was not coded. Controlling for implementation quality in future research might help to shed more light on this issue. Another possible explanation for the observed curvilinear relationship is that if a program does not match the level of participants' deficit in interpersonal and emotion skills or participants' treatment motivation, the program could be ineffective or have adverse effects (Bonta & Andrews, 2007; Wilson & Hoge, 2013).

Assessment of the overall effect size of SST programs on more distal outcome domains showed that SST programs also yield positive effects on peer relationship problems, internalizing behavior, and externalizing behavior. For these outcome domains, we did not find meaningful associations between the inclusion of psychoeducational, psychophysical, and skill-building components and SST program effects. Peer relationship problems, internalizing problem behavior and externalizing problem behavior probably each have a wider range of contributing factors, which makes it more difficult to reveal the influence of independent training components.

The overall effect size found in this study is similar to the effects found in some previous meta-analyses (i.e., Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Sklad et al., 2012) and somewhat smaller than the effects found in others (i.e., Denham & Almeida, 1987; Schneider, 1992). Our study shows that the average person scores 13 percent higher on a social-emotional outcome after an SST program (Coe, 2002). It is important to consider here that most of the included programs are universal prevention programs aimed at the general school population. One can assume that not all children participating in a universal program actually need the extra support, and in that context, a small positive effect for SST programs could mask the existence of intervention response subgroups (Vacha-Haase & Thompson, 2004). For instance, a recent study on the effects of the Incredible Years parenting intervention uncovered that in a prevention context, only 18 percent of the targeted families benefitted from the program—but did so to a large extent (Cohen's d = 1.45)—whereas most families did not benefit. The families that benefited the most were the ones with the highest parenting and child behavior problems (van Aar et al., 2019). Similarly, the small effect size on interpersonal and emotional skills found for SST programs in our study might indicate that a small group of children benefits substantially from the program, while a larger majority does not, simply because they already have adequate social skills. Heterogeneity in SST program effects across individuals points to the importance of analyzing subgroups of SST participants to gain insight into what training components work best for whom.

What do these findings tell us about the origin of SST program effects? Psychoeducational and skills-building exercises seem to be important for strong program effects, granted that the dosage is right. However, the inclusion of psychophysical and cognitive-emotional components does not necessarily seem to lead to superior SST program effects. This could signal that, to some extent, program effects are explained by the specific components in

an SST program, which is in line with the specificity hypothesis (Chorpita & Daleiden, 2009). Heterogeneity in SST program effects that is not explained by the inclusion of specific training components can perhaps, for a substantial part, be accounted for by several non-specific or "common factors". According to the common factors approach (Wampold et al., 1997), the alliance between a client and therapist, a therapist's belief in a program's effectiveness, and other therapist effects may be equally important for positive program effects (Messer & Wampold, 2002)which posits specific treatment effects for patients with specific diagnoses. Furthermore, studies of other features of this modelsuch as component (dismantling. Such non-specific factors presumably also account for the variance between studies and programs. For example, meta-analyses (Horvath & Symonds, 1991; Shirk & Karver, 2003) have shown that a positive therapist-client relationship is related to better training outcomes. This might also be related to a therapists' experience (Mallinckrodt & Nelson, 1991) and their expression of confidence and interest in clients (Saunders, Howard, & Orlinsky, 1989)empathic resonance, and mutual affirmation. Working alliance is the patient and therapist's perception of their individual role throughout the sessions. Empathic resonance is the quality of the relationship, or each participant's feelings of being understood and understanding. Mutual affirmation is the feeling of acceptance and concern from the patient and the therapist. This study wanted to create a reliable measurement of the therapeutic relationship from the viewpoint of the patient. This study addressed two main questions: (a. Information about such common factors is generally not included in SST program manuals or the studies evaluating these programs. Thus, it was not possible to assess whether non-specific factors were related to SST program effects in this study. To be able to draw conclusions concerning the effectiveness of common factors in the future, it is important that information about non-specific factors such as a trainers' confidence in a SST program are reported in forthcoming studies.

The current meta-analysis provided some additional remarkable findings. For one, we found that SST programs provided by mental health professionals and SST programs given by school personnel (i.e., teachers or school nurses) yielded similar effects. The fact that we excluded studies evaluating SST program effects for special populations such as children with ADHD or autism may explain this finding. In the included samples, participants' problem behavior is mostly below the clinical cut-off, and the implementation of SST programs in such samples does not seem to require the expertise of mental health professionals. Another explanation may be that consideration of the development of interpersonal and emotional skills has become more embedded in the tasks of school personnel, rendering them more qualified to provide SST programs and eliminating the necessity for specialized certification before program implementation. This could imply that a broader range of at-risk children and adolescents could be reached by including SST programs in the regular academic curriculum.

Checking the robustness of our main findings suggested that study quality impacts the magnitude of effects of SST programs. We found that studies with smaller sample sizes yielded larger effect sizes, which is likely related to the finding for study quality. Studies with a weak or moderate quality rating predominantly had a small sample size, whereas studies with a high-quality rating mostly had a large sample size. The absence of thorough

randomization into experimental groups in low and moderate-quality studies might threaten internal validity, leading to an overestimation of SST program effects, and this is mostly the case in studies with a small sample size (Weisburd, Lum, & Petrosino, 2001). This finding is in line with findings from previous meta-analyses (e.g., Zhang, Xu, & Ni, 2013).

A common disadvantage of meta-analyses is the dependence on the information available (Borenstein et al., 2009a). In this study, we depended on study authors to provide us with program manuals. It is conceivable that authors were less likely to share a program that proved ineffective, which may have resulted in the significant publication bias we found, leading to an overestimation of program effects. Moreover, we could not investigate the interaction between components and have, therefore, assessed the training components independently. For this reason, we cannot make inferences about combinations of components that might perhaps amplify or attenuate SST program effects (Dusseldorp, van Genugten, van Buuren, Verheijden, & van Empelen, 2013)in theory, BCTs can amplify each other, the available meta-analyses have not been able to identify specific combinations of techniques that provide synergistic effects. This study overcomes some of the shortcomings in the current methodology by applying classification and regression trees (CART.

The agreement between coders might be considered a limitation of this study. It proved challenging to reach perfect alignment between coders concerning the content of the psychoeducational components of SST programs. We traced this to difficulties in the distinction between introductory information to SST exercises and pure psychoeducational exercises. This should be a point of attention if this study were to be replicated in the future.

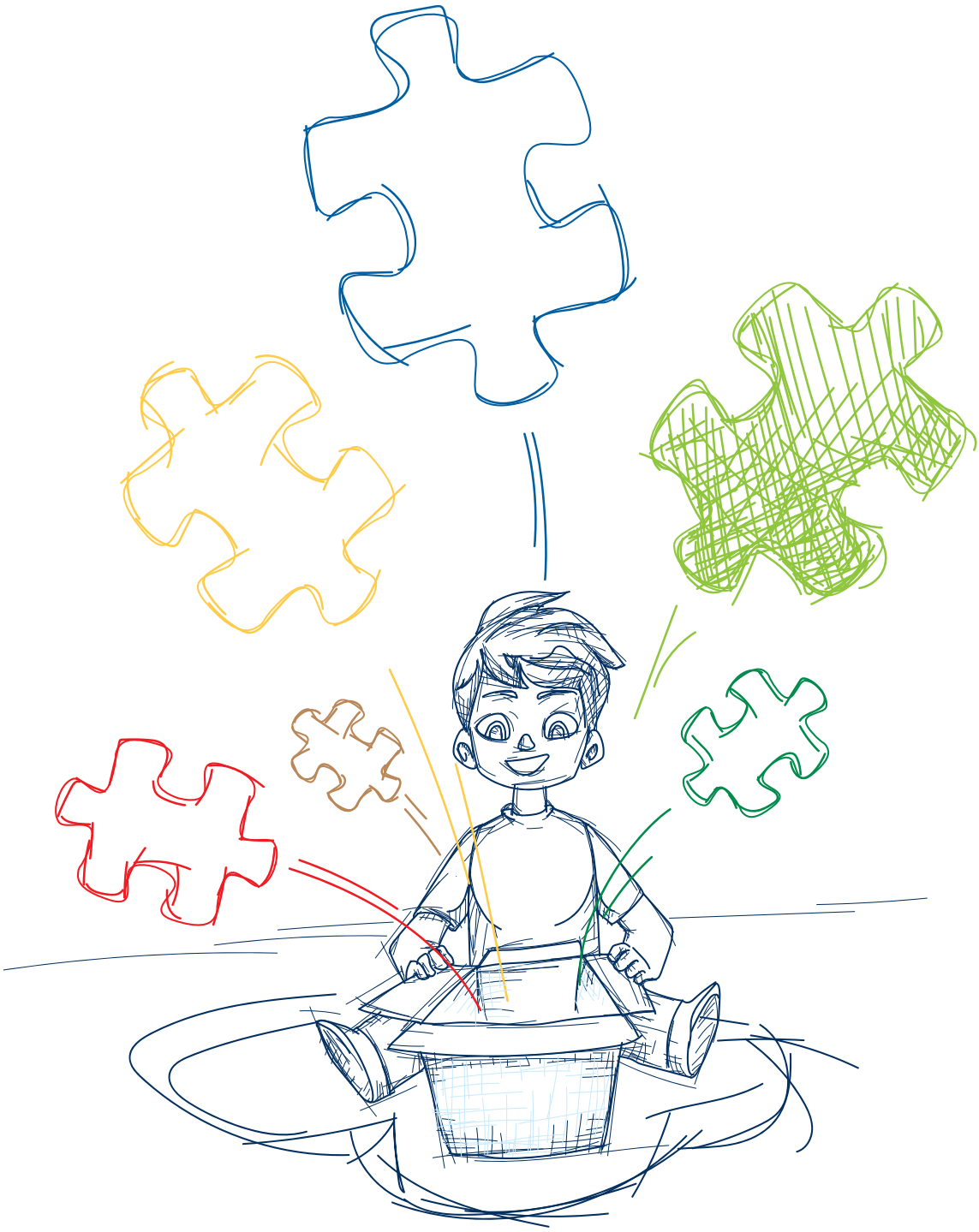
Finally, we need to acknowledge the problem of multiplicity in this meta-analysis. We did not control for repeated significance testing, and consequently, some of our findings may be attributable to Type I (i.e., false-positive) error. Since this is a first meta-analysis investigating individual training components, more research is needed to draw strong conclusions on the effectiveness of individual SST components. The current findings can be used to generate hypotheses that might be tested in forthcoming studies, for example using microtrials (Howe, Beach, & Brody, 2010) or additional meta-analyses.

Notwithstanding these limitations, our meta-analysis is the first to relate distinct training components to the effects of a large number of SST programs. We coded program information directly from program manuals, which allowed for detailed, schematic coding of the SST programs. Additionally, we assessed the dosage of training components, which provided valuable results we would have otherwise missed. The findings from the current study should be viewed as a first step towards uncovering the effective training components of SST programs.

In terms of practical implications, our findings suggest that SST programs yield positive effects on various outcome domains, and interpersonal and emotional skills seem to be most positively influenced. SST programs that include psychoeducational and skill-building exercises produce significantly stronger effects on interpersonal and emotional skills, but only when administered with the right dosage. When aiming to improve interpersonal and emotional skills, programs up to 16 weeks seem to generate optimal

results. Booster components do not seem to influence program effects. These exercises could be replaced by more effective components or be removed to shorten programs. Such adjustments could make SST programs more cost-effective and leave more time for the regular academic curriculum, which is usually offered parallel to SST programs. However, it is also possible that the association between booster components and SST program effects only emerge after a follow-up period. Therefore, future meta-analyses of this type should also include long-term outcomes of SST program evaluations.

Nevertheless, the effect sizes found are moderate at best, and there is significant heterogeneity between studies, which suggests that not all participants benefit equally from SST programs. It is also important to keep in mind that the current meta-analysis only considered the immediate effects of SST programs. Currently, it is unclear whether SST program effects are generally sustained (e.g., Clarke, Bunting, & Barry, 2014) or lost at follow-up (e.g., Berry et al., 2016), or whether there are sleeper effects (e.g., Essau, Conradt, Sasagawa, & Ollendick, 2012). An important next step in effective components research is assessing the synergistic effects of combinations of individual training components. Additionally, future research could meta-analyze individual participant data from pooled intervention datasets to further examine what works best for whom (Riley, Lambert, & Abo-Zaid, 2010).



CHAPTER 3

Exposure, cognitive restructuring, or a combination of both? A microtrial into intervention components to reduce social anxiety in children.

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Abstract

Programs that aim to reduce symptoms of social anxiety in children generally include multiple components, such as exposure and cognitive restructuring. It is unknown if separate components yield positive intervention effects in children or whether a combination of components is required. We investigated the effectiveness of exposure, cognitive restructuring, and a combination of both components in reducing social anxiety symptoms and anxiety-related outcomes in an indicated-prevention setting. To this end, we conducted a microtrial using a sample of 191 children from grades four to six (M = 10.48, SD = 1.10). Children with elevated social anxiety symptoms participated in one of three group interventions each lasting four-weeks and completed a questionnaire at four measurement occasions. Results from latent change modeling demonstrated that the interventions with either exposure or cognitive restructuring reduced social anxiety symptoms and anxiety-related outcomes. The analyses showed that both of these intervention components were effective, with more favorable effects for exposure. Combining exposure and cognitive restructuring techniques did not yield greater benefit than either component alone. It is imperative that future research investigates whether specific components may be more effective for particular subgroups (e.g., based on level of behavioral inhibition) in more detail.

Exposure, cognitive restructuring, or a combination of both? A microtrial into intervention components to reduce social anxiety in children.

Social anxiety is relatively common in Western societies. It is in the top three most prevalent disorders (Kesseler et al., 2005), with an estimated 7 to 13% of individuals experiencing social phobia at some point during their life (Furmark, 2002). The prevalence of social phobia in adolescents ranges from 3 to 9% (Ranta et al., 2015). Social anxiety seems to be relatively stable over time, and individuals suffering from this disorder are generally reluctant to seek help (Baer & Garland, 2005).

Social anxiety is primarily characterized by a fear of negative evaluation and by distress in, and potential avoidance of social situations. Socially anxious children and adolescents often experience excessive physiological arousal in social situations, particularly in public performance situations (American Psychiatric Association, 2013; Rapee & Spence, 2004). Similar to other forms of anxiety, social anxiety can reach such high levels that it causes distress and inhibits normal functioning. For instance, maladaptive, automatic cognitions may inhibit adequate processing of social information and may trigger anxious behavior (Rapee & Spence, 2004). Social anxiety in youth has been related to low self-esteem and fewer friendships (Fordham & Stevenson-Hinde, 1999), impaired social skills (Miers et al., 2009), loneliness, and the development of depression and substance abuse later in life (Rapee & Spence, 2004). Social anxiety can also lead to school refusal because situations that provoke social anxiety often occur in the school setting (Beidel et al., 1999).

Even though the average age-of-onset for social anxiety disorder is thirteen, prodromal symptoms of social anxiety can already be present in childhood (Miers et al., 2013). In early childhood, social anxiety can present itself as self-conscious shyness, which is precipitated by a fear of social evaluation (Asendorpf, 1989; Turner et al., 1990). From a prevention standpoint, it is thus crucially important to direct intervention efforts at children, to protect them from developing clinical-level anxiety and related impairments (Baer & Garland, 2005; Beidel et al., 1999).

A wide variety of child-focused programs are currently available to reduce social anxiety in children and adolescents, and group interventions in both the clinical context and school context have shown positive effects (Scaini et al., 2016). However, because social anxiety interventions combine multiple components, it is unknown what exactly drives program effects. To fill this gap, we performed a microtrial study that investigated which intervention components (i.e., gradual exposure, cognitive restructuring, or a combination of both) were effective in reducing social anxiety symptoms and related outcomes in children with elevated social anxiety symptoms.

Exposure and Cognitive Restructuring in Social Anxiety Interventions

Two core components of interventions aimed at preventing or treating social anxiety are exposure and cognitive restructuring. The goal of the first component, exposure,

is to reduce affective and behavioral symptoms of anxiety by entering and remaining in a situation that provokes fear (Rodebaugh et al., 2004). By exposing the individual to fear-provoking stimuli, they learn new adaptive responses to fearful situations (e.g., engagement instead of avoidance). Exposure thus reduces the association between anxiety-provoking situations and their feared negative consequences and helps children to overcome their avoidance of social situations. Exposure might also teach anxious children to control and reduce visible signs of arousal, which can help them experience successful social interactions. In turn, this may decrease their negative peer experiences, such as isolation and bullying victimization (Rapee & Spence, 2004). Additionally, through creating positive experiences, exposure might increase an anxious child's perceived social competence (Donders & Verschuren, 2004).

The second core intervention component, cognitive restructuring, focusses on the cognitive processes that emerge in (anticipation of) situations that provoke anxiety (Rapee & Spence, 2004). The purpose of cognitive restructuring is to identify and challenge automatic, negative, and self-defeating thoughts and to implement more positive, helpful thoughts (McLellan et al., 2015). Cognitive restructuring teaches children to change negative cognitive appraisals, reduce self-criticism, and modify interpretations of social stimuli to reduce anxiety in social situations (Rodenbaugh et al., 2004; Taylor et al., 1997). For example, socially anxious children generally anticipate adverse outcomes of performance, overestimate the visibility of their nerves, negatively evaluate their behavior, and think negatively about their performance (Miers et al., 2009; Spence et al., 1999). Some socially anxious children even undermine their adequate social competence through their negative self-perceptions (Miers et al., 2009). By tackling maladaptive cognitions in a cognitive restructuring approach, children learn to more accurately perceive and thus anticipate social situations, which should reduce their anxiety (Taylor et al., 1997).

The treatment of socially anxious children is challenging because social anxiety has various interrelated etiological determinants (Wong & Rapee, 2015). Nevertheless, a meta-analysis by Scaini et al. (2016) showed that cognitive-behavioral therapy interventions have significant effects (Cohen's d = .71) on children's and adolescents' social anxiety symptoms. However, the programs included in this meta-analysis combined cognitive techniques, exposure, and social skill-building in a multi-component program, making it difficult to make inferences about the effectiveness of individual intervention components. Information about the effects of separate intervention components is crucial because it provides insight into which components are necessary for improvement, thereby maximizing intervention effects.

Our goal of identifying effective components of childhood-based social anxiety programs is informed by previous research in adults. A meta-analysis by Feske and Chambless (1995) found that cognitive therapies and exposure therapies yielded similar effects in reducing social anxiety symptoms and negative thoughts. Furthermore, a review of five meta-analyses concluded that both exposure and cognitive restructuring reduced social anxiety symptoms, and that a combination of cognitive restructuring and exposure did not seem superior compared to exposure alone (Rodebaugh et al., 2004). These findings

provide insight into the effects of separate intervention components for clinically socially anxious adults, but it remains unclear if these findings also apply to children. To our knowledge, the only meta-analysis that evaluated the effectiveness of cognitive-behavioral interventions for children and adolescents with a clinical diagnosis of social anxiety was conducted by Scaini et al. (2016), but this meta-analysis did not specifically compare the effects of exposure and cognitive restructuring. Thus, empirical research into the separate effectiveness of components in childhood social anxiety interventions is absent, especially in an indicated-prevention context.

The Present Study: A Microtrial Approach

We applied a microtrial approach to identify whether exposure, cognitive restructuring, or a combination of both were effective in reducing social anxiety in children. A microtrial is a brief and focussed randomized experiment that can assess whether an isolated intervention component brings about significant change (Howe et al., 2010). Using a microtrial approach has several specific advantages. First, it can elucidate which intervention components are not effective, and can thus help to develop leaner, more efficient interventions. Second, it can elucidate which specific components *are* effective, and thus provide knowledge to develop more specific, targeted interventions (Chorpita et al., 2005a; Leijten et al., 2015). The sample for the present microtrial consisted of eight- to twelve-year-old children with elevated symptoms of social anxiety who participated in a brief four-week preventive group intervention. We aimed to answer two research questions: (i) Are brief group interventions using exposure, cognitive restructuring, or combining both components, effective in reducing social anxiety symptoms and related outcomes?; (ii) Is there a difference in effectiveness between the brief group interventions using exposure, cognitive restructuring, or a combination of both?

We included both primary and secondary outcomes to assess the effectiveness of the interventions. The primary outcomes were directly related to the diagnostic criteria for social anxiety disorder and prominent social anxiety cognitive models (American Psychiatric Association, 2013; Clark & Wells, 1995), and consisted of social anxiety symptoms, anxious behavior, distress, avoidant behavior, approach behavior, positive thoughts and perceived social threat. The secondary outcomes were outcomes related to social anxiety more broadly: internalizing behavior, self-efficacy, social skills, and self-perceived competence.

We specifically focussed on eight- to thirteen-year-olds because children in this age group are approaching the onset period for clinical diagnosis of social anxiety (Rapee & Spence, 2004). We expected social anxiety symptoms and related outcomes to reduce in all three types of preventive intervention. We did not formulate hypotheses about the expected difference in the effectiveness of exposure versus cognitive restructuring due to a lack of relevant research in this age group. Nevertheless, we might expect that a combination of two evidence-based intervention components would yield more substantial effects than the separate components.

Method

Participants

Participants for this study were children with social anxiety symptoms from the three highest grades of 16 Dutch primary schools (equivalent to American grades four to six), predominantly located in urban areas. We invited a total of 248 children to take part in the study (see flowchart in Figure 1). The parents of 23% (*n* = 57) of these children did not actively consent to participation, resulting in a final sample of 191 children: 82 children in the exposure condition, 73 children in the cognitive restructuring condition and 36 children in the condition combining both components (hereafter: combination condition).

The final sample had a mean age of 10.48 years (*SD* = 1.10, range 8.11 to 13.29 years) with somewhat more girls (63.4%, *n* = 121). Ethnicity was defined as follows: 55% (*n* = 104) of the children had a Western origin (87% Dutch) and 44% (*n* = 84) had a Non-Western origin (30% Turkish, 27% Moroccan, 16% Surinamese/Antilles, 27% other; Dutch Bureau for Statistics, n.d.). Three children did not disclose their ethnicity. Children in our sample had a mean score of 53.52 on the Social Anxiety Scale for Adolescents (SAS-A), which is just above the clinical cut-off (La Greca & Lopez, 1998).

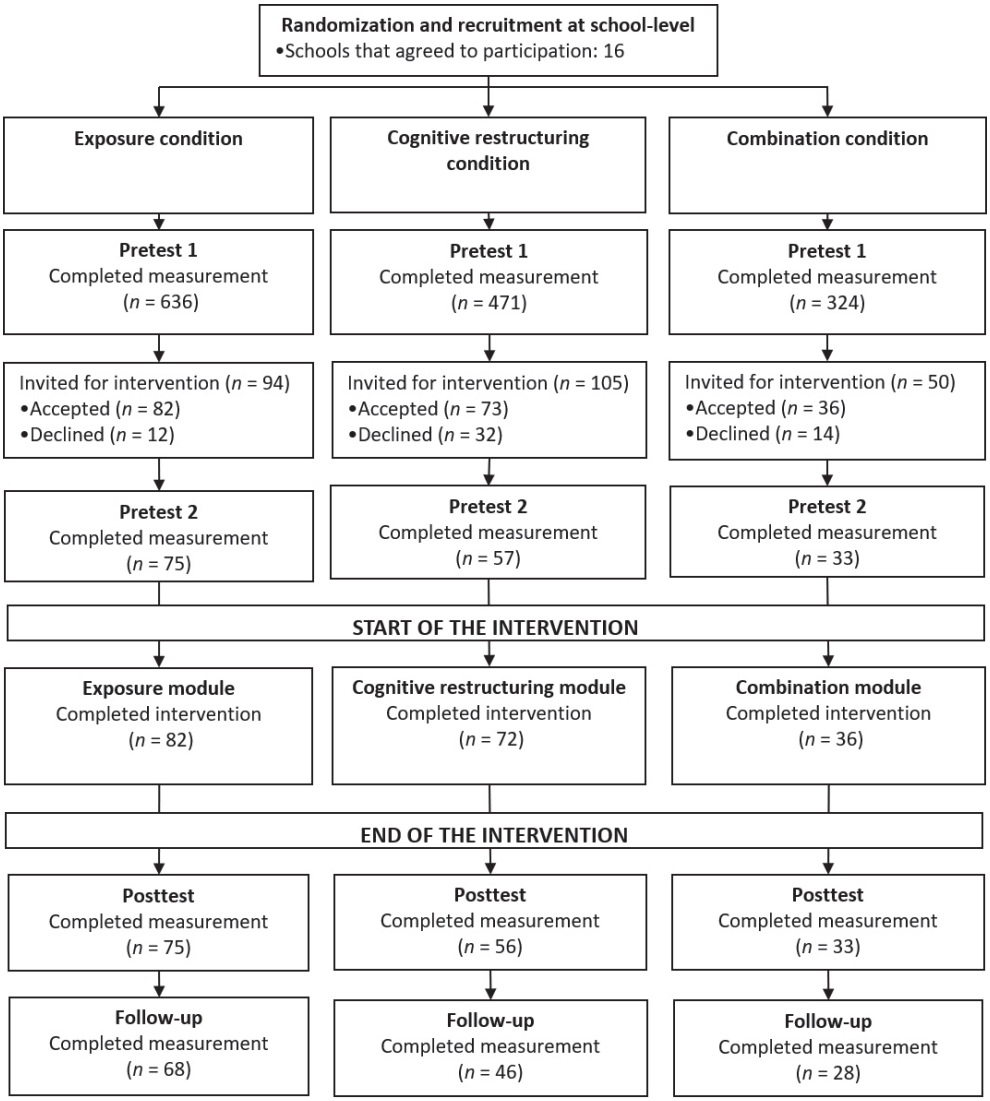
Design

The microtrial design included three conditions and four time points: pretest 1 (approximately five weeks before the start of the intervention), pretest 2 (one week before to the start of the intervention), posttest (one week after the end of the intervention), and follow-up (three months after posttest). By including two pretest measurements, individual change before the intervention could be compared to the change from pretest 2 to posttest. Schools were randomized prior to the invitation to participate and were blind to the assigned condition. A priori power analysis showed that 52 participants were necessary per condition to find a main effect of condition with a medium effect of .40, a power of .80, and an alpha of 0.05 (two-sided). The Ethics Review Board of the University of Amsterdam approved this study (protocol number 2017-CDE-8033) and this study was registered with the ISRCTN registry (ISRCTN76653370).

Sampling Procedures

We invited schools that provided regular primary education and had a sufficiently large school size (i.e., at least 50 children in the top three grades) to participate in this study by invitation letter. We anticipated a fair number of schools to turn down the invitation to the study due to the high workload in primary schools, and therefore, we invited a total of 100 primary schools to the sample. Seven schools agreed to participate. A second recruitment wave added nine schools to the sample. These schools were recruited through an advertisement in a national magazine for school counselors.

Figure 1. *Participant Flowchart.*



Procedure

Parents were informed about the study, and passive consent was requested before the first measurement occasion, which served as the first pretest as well as the screening for the intervention. At pretest 1, research assistants or the first author visited children in their classrooms to explain the goals of the study. Children were not told that pretest 1 would be used to identify children with emerging social anxiety symptoms to avoid drawing negative attention to children selected for the intervention. The completion of the questionnaires took approximately 60 minutes at each measurement occasion. Children without parental consent stayed in the classroom and worked on individual tasks or read a book.

Children were selected for the interventions based on their score on the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998) at pretest 1. For every school, children's scores on the SAS-A were mean-centered per grade, and the children scoring in the highest 20% on social anxiety within their class distribution were considered eligible for the intervention. School personnel then reviewed the eligible children. School personnel did not agree with the selection of seven participants—because of participation in another social-emotional intervention program, not speaking Dutch fluently, or a clinical diagnosis of Autistic Spectrum Disorder, for example—, and were allowed to propose other children. The SAS-A scores of the proposed children had to be higher than the class mean to participate in the intervention.

After the final list of participants had been agreed upon, we distributed another information letter, requesting active parental consent to participate in the rest of the study. There was no monetary incentive. Children with parental consent participated in the intervention, which was provided by eight certified trainers who had an average of five years of experience. The children completed the questionnaire an additional three times (see Figure 1). At pretest 2, posttest, and follow-up, school personnel supervised the measurement. After the last measurement occasion, all schools received 50 euros as compensation for their participation in this study. We collected all data between September 2017 and April 2019.

Measures

Primary Outcome Measures

Social Anxiety. Children filled out the Dutch translation of the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998), a 22 item scale assessing fear of negative evaluation, social avoidance, and distress in new situations, and general social avoidance and distress. Items were rated on a five-point scale (*1 = never*, *5 = always*), and the sum of the 18 substantive items (four are filler-items) comprised the total score. The psychometric properties of this scale are good (La Greca & Lopez, 1998). In this study, reliability was satisfactory across measurement occasions (α =.77 to .91).

Anxious Behavior. Children's anxious behavior was measured using an adaptation of the Teacher Rating Scale of Social Anxiety-"junior" (TRSA-"junior"; Bokhorst et al., 2001). The items were re-worded into a six-item self-report scale to assess anxious behavior in different scenarios. An example of an item is "When I know the answer to the teacher's question, I'm not afraid to say so", which children rated on a five-point scale (*1 = always* to *5 = never*). Other items asked children to rate how distressed they feel in different situations. An example item is "When we have a class discussion, I am afraid to say something". These items were rated on a five-point scale (*1 = not afraid* to *5 = very afraid*) as well. The sum of the six items comprised the scale score. In this study, reliability was satisfactory across measurement occasions (α =.66 to .90).

Distress, Avoidant, and Approach Behavior. To assess levels of distress and to assess if children actively try to avoid specific social situations, we developed a questionnaire based

on social situations from the Anxiety Disorders Interview Schedule for Children (ADIS-C; Silverman & Albano, 1996). These situations have previously been used to measure distress and avoidance (Miers et al., 2014; Sumter et al., 2009). In this study, we adapted the scale by selecting five social situations that can provoke anxiety and are relevant to the age group of this study (i.e., answering a question in class, reading aloud in class, giving an oral presentation, playing with unfamiliar children, and asking a classmate a question), and by adding an item to measure the tendency to approach social situations. These adaptations resulted in the Distress, Avoidance, Approach, and Self-efficacy (DAAS) scale.

The DAAS presents children with a social situation, for example, "Imagine you are in class and your teacher asks you to answer a question". Children rated (i) how distressed they would feel when faced with the presented situation (subscale Distress; *1 = I feel good* to *5 = I feel very tense*, 5 items); (ii) the extent to which they try to avoid the situation (subscale Avoidance, *1 = I never do* to *5 = I always do,* 5 items) and; (iii) the extent to which they look forward to the situation if it were to occur in one week (subscale Approach, *1 = I look forward to it a lot* to *5 = I do not look forward to it at all,* 5 items). For each subscale, the sum of the five items comprised the total score. The reliability was satisfactory across measurement occasions (Distress: α = .63 to .91; Avoidance: α = .65 to .91; Approach: α = .72 to .94). The subscale Self-efficacy was used as a secondary outcome measure and is described below.

Positive Thoughts and Perceived Social Threat. The Children's Automatic Thoughts Scale – Negative/Positive (CATS-N/P; Hogendoorn et al., 2010) was used to assess children's negative and positive thoughts. The subscales Perceived social threat (10 items) and Positive thoughts were used (10 items). Items were answered on a five-point scale (*1 = never* to *5 = always*), and the sum of the items comprised the subscale scores. The CATS-N/P has satisfactory psychometric properties (Hogendoorn et al., 2010; Hogendoorn et al., 2012). In this study, the reliability of was good across measurement occasions (Perceived social threat: α = .85 to .96; Positive thoughts: α = .82 to .97).

Secondary Outcome Measures

Internalizing Behavior. Children's internalizing behavior was measured using the subscale Internalizing problem behavior from the Dutch translation of the self-report version of the Social Skills Improvement System-Rating Scales (SSIS-RS; Gresham & Elliott, 2008). This 10-item subscale is answered on a four-point scale (*1 = not true* to *4 = very true*). The sum of the items comprised the subscale score. Psychometric properties for the English version of the SSIS-RS are strong (Gresham et al., 2011). In this study, reliability was satisfactory across measurement occasions (α =.62 to .89).

Self-Efficacy. Self-efficacy was measured using the subscale Self-efficacy from the DAAS. An example item is "How well do you think you can read aloud in class?" and items were answered on a five-point scale (*1 = I will do very well* to *5 = I will not do well at all*). The sum of the items comprised the subscale score. In this study, reliability was satisfactory across measurement occasions (α = .67 to .95).

Social Skills. Children's social skills were also measured using the SSIS-RS (Gresham & Elliott, 2008; van den Heuvel et al., 2017). We used the subscales Assertion (7 items),

Cooperation (7 items), Communication (6 items), Responsibility (7 items), Empathy (6 items), Engagement (7 items) and Self-control (6 items). All items of these scales were answered on a four-point scale (*1 = not true* to *4 = very true*). The sum of the items across the subscales comprised the outcome Social skills. In this study, reliability was good across measurement occasions (α = .96 to .99).

Self-Perceived Competence. Children's self-perceived competence was measured using the Dutch translation (Veerman et al., 1997) of the Self-perception Profile for Children (SPPC; Harter, 1985), which comprises 18 items. Originally items consisted of two opposing statements, and children indicate how true the best fitting statement is for them. To simplify the items and make them more consistent with the other measures, we reformulated items and answering categories. An example item is "I have a hard time making friends". Items were answered on a four-point scale (*1 = not true at all* to *4 = very true*) and the sum of the items comprised the scale score. In this study, reliability was good across measurement occasions (α = .82 to .86).

Intervention Modules

The intervention modules were inspired by cognitive behavioral intervention programs such as Cool Kids (Rapee et al., 2006) and PASTA training (Sportel et al., 2013). We adapted exposure exercises and cognitive restructuring exercises to fit the purpose of this study. The modules were reviewed by a professional with over ten years of experience as a trainer to ensure the appropriateness for the target audience and employability of the modules.

Several elements were the same for all three intervention modules: (i) they started with three exercises on psychoeducation about social anxiety; (ii) the exercises gradually built up to the situation of giving an oral presentation in front of the class; (iii) they were implemented as a group training consisting of four one-hour sessions, provided over a month; (iv) they were given during school hours in groups of eight to ten children, and (v) they included supportive materials, such as a workbook for participants and posters. A broad overview of the intervention modules is given in the following paragraphs. Appendix A, Table A.1 provides more detailed information, and the full module-manuals are available upon request from the third author (AM).

Exposure Module

The exposure exercises in this module dealt with three situations that can be difficult for socially anxious children: one social interaction situation, starting and joining a conversation, and two performance situations, asking and answering a question and giving an oral presentation. These situations were divided into smaller steps that gradually increased in difficulty. These steps were presented to children using the metaphor of a stepladder, which disassembles larger tasks or goals into small steps (see Appendix A, Table A.2).

Cognitive Restructuring Module

In the cognitive restructuring module, the same three social situations were used

hypothetically (e.g., "Imagine you have to answer a question in class") to teach children to reflect on the influence their thoughts have on their behavior. The cognitive restructuring module worked with a handout containing six steps to turn negative thoughts into positive, helpful thoughts (see Appendix A, Table A.3).

Combination Module

The combination module combined the components exposure and cognitive restructuring into one module. This module taught participants that anxiety reduces by decomposing an anxiety-provoking situation into small steps as well as by identifying negative thoughts and replacing them with positive, helpful thoughts. As this module had to fit exposure exercises as well as cognitive restructuring exercises into four sessions, participants worked with only two social situations, namely starting and joining a conversation, and giving an oral presentation. The exercises aimed at cognitive restructuring preceded the exposure exercises in every session and were similar in structure to the exercises in the cognitive restructuring module. The exposure exercises were mostly the same as in the exposure module, with one key difference: the instructions before the exposure exercises reminded children to think about the positive thoughts they had previously formulated.

Statistical Analyses

The data were analyzed using latent change models (LCMs) in M*plus* version 7.31 (Muthén & Muthén, 1998-2015). All analyses were intention-to-treat, and models were fit using full information maximum likelihood (e.g., Raykov, 2005), which makes optimal use of available information.

To assess if the three conditions yielded significant changes in the 11 outcome variables (research question i), we evaluated LCMs using multigroup analysis. We based our models on the model described by Schmidt et al. (2014). A model with pretest 2 as the reference point (i.e., intercept) allowed us to assess the changes in children's self-reported behavior from pretest 1 to pretest 2 (hereafter the pre-intervention period), and from pretest 2 to post-test (hereafter the intervention period). An equivalent model with posttest as the intercept allowed us to assess the changes from posttest to follow-up (hereafter follow-up period). For an illustration of our model, see Appendix B, Figure B.1. We used chi-square statistics, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI; Hu & Bentler, 1999) to evaluate absolute model fit.

To assess the difference in the effectiveness of an intervention with exposure, cognitive restructuring, or both on each of the outcome variables (research question ii), we constrained the change parameters of two conditions to equality and compared the fit of the constrained model to the fit of the unconstrained model using a chi-square difference test. M*plus* syntax for the LCMs is available in Appendix B.

Results

Preliminary Analyses

The conditions did not differ concerning children's age or gender. The cognitive restructuring condition (CR-condition in this section) contained significantly more non-Western children (79.5%) than the exposure condition (EXP-condition in this section; 22%) and the combination condition (CM-condition in this section; 22.2%; χ^2 [2, N = 188] = 65.76, $p < .001$). We therefore controlled for ethnicity in further analyses. Children in the CR-condition reported less distress (F [2, 187] = 13.56, $p < .001$) and more approach behavior (F [2, 187] = 9.01, $p < .001$) at pretest 1 compared to children in both the EXP-condition and the CM-condition. There were no differences by condition for the other outcome variables.

Table 1 presents the raw means and standard deviations of all outcome variables at every measurement occasion for all three conditions. An inspection of bivariate correlations indicated that all variables significantly correlated in the predicted direction at all time points. Appendix C, Tables C.1 and C.2 presents the correlation matrices.

Table 1. *Means (M) and Standard Deviations (SD) for the Primary and Secondary Outcome Measures.*

	Exposure				Cognitive restructuring				Combination			
	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up
Outcome	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Social anxiety	53.22 (9.73)	52.00 (13.04)	45.92 (13.59)	42.60 (12.29)	55.96 (11.10)	49.79 (13.27)	40.80 (15.52)	39.84 (15.66)	53.29 (11.23)	51.70 (12.96)	50.34 (15.62)	45.31 (14.52)
Anxious behavior	14.29 (3.90)	15.23 (4.81)	13.43 (5.05)	12.50 (4.09)	14.36 (5.05)	13.56 (4.55)	10.91 (4.11)	11.41 (4.71)	14.78 (4.73)	15.50 (5.23)	13.81 (5.47)	13.02 (5.74)
Distress	14.77 (3.37)	15.17 (4.38)	13.34 (4.70)	12.28 (4.12)	12.12 (3.77)	12.07 (4.60)	9.54 (4.30)	9.83 (4.37)	15.26 (3.84)	15.23 (4.52)	13.15 (5.50)	12.48 (5.54)
Avoidant behavior	10.72 (3.92)	11.15 (4.59)	9.99 (3.85)	8.74 (3.65)	10.04 (3.47)	9.25 (3.69)	7.82 (3.35)	8.20 (3.37)	10.81 (4.50)	11.70 (4.94)	10.89 (3.93)	9.95 (4.54)
Approach behavior	8.86 (3.68)	9.03 (4.18)	9.65 (3.42)	10.19 (3.90)	11.00 (3.98)	11.07 (3.57)	12.92 (3.71)	12.83 (4.06)	8.11 (3.90)	7.33 (4.20)	8.98 (4.38)	9.31 (5.19)
Positive thoughts	21.40 (6.84)	22.22 (8.83)	24.74 (8.06)	24.72 (8.80)	23.12 (9.07)	24.27 (8.62)	27.14 (8.20)	26.43 (9.93)	22.90 (7.75)	21.77 (9.48)	23.19 (8.29)	24.11 (8.33)
Perceived social threat	21.84 (7.42)	20.70 (7.33)	19.16 (7.44)	17.10 (6.06)	22.31 (8.96)	21.22 (8.72)	18.42 (8.13)	18.27 (8.27)	20.95 (8.45)	20.65 (8.68)	20.90 (9.35)	18.00 (7.80)
Internalizing behavior	21.76 (6.45)	21.45 (6.72)	20.13 (7.01)	18.85 (6.99)	21.06 (6.52)	20.53 (7.92)	18.51 (6.09)	17.52 (6.55)	21.99 (6.82)	22.36 (7.20)	19.38 (6.50)	20.89 (8.00)
Self-efficacy	11.11 (3.05)	10.89 (3.70)	12.19 (3.66)	12.48 (3.52)	12.19 (3.66)	12.41 (3.57)	13.94 (3.71)	13.65 (4.06)	11.14 (3.66)	10.14 (3.95)	12.19 (3.94)	12.96 (3.56)
Social skills	136.27 (20.94)	141.25 (17.11)	145.06 (19.33)	148.06 (19.05)	137.35 (22.26)	141.39 (22.41)	143.83 (23.79)	145.62 (28.17)	133.47 (19.19)	136.13 (18.02)	133.12 (21.46)	137.38 (18.83)
Self-perceived competence	54.03 (8.81)	55.50 (8.57)	57.41 (8.61)	58.97 (8.31)	53.75 (9.89)	55.81 (10.01)	58.49 (9.45)	57.77 (9.72)	54.34 (8.78)	55.30 (9.37)	56.60 (8.67)	58.06 (7.46)

Intervention Component Effects

We assessed the effectiveness of the individual intervention components using unconstrained multigroup latent change models (LCMs), and the fit indices were adequate for all outcomes: chi-squares were non-significant, RMSEA values were lower than .08, and CFI values were higher than .95 (see Appendix D, Table D.1 for the full fit statistics). Table 2 presents parameter estimates for all models. Bold parameters indicate a significant difference between the change during the intervention period and the change during the pre-intervention period. Appendix D, Table D.2 presents the complete fit indices for the constrained models and chi-square differences.

Effectiveness of Exposure

Primary Outcome Measures. Children in the EXP-condition significantly improved on all primary outcome measures during the intervention period. These improvements were significantly larger than the non-significant changes during the pre-intervention period for social anxiety ($\Delta\chi^2 = 17.25$, $p < .001$), distress ($\Delta\chi^2 = 8.84$, $p < .01$), approach behavior ($\Delta\chi^2 = 5.97$, $p < .05$), positive thoughts ($\Delta\chi^2 = 15.21$, $p < .001$), and perceived social threat ($\Delta\chi^2 = 11.48$, $p < .001$). The improvement for anxious behavior was also significantly different from the change during the pre-intervention period when children's anxious behavior significantly worsened ($\Delta\chi^2 = 4.33$, $p < .05$). Improvements during the intervention period on children's avoidant behavior were not significantly larger than during the pre-intervention period ($\Delta\chi^2 = 3.08$, $p > .05$).

Children reported an additional significant improvement on social anxiety, distress, and avoidant behavior during the follow-up period. Children's improvement on social anxiety and distress during the follow-up period was significantly smaller, however, than during the intervention period ($\Delta\chi^2 = 33.91$, $p < .001$, and $\Delta\chi^2 = 27.56$, $p < .001$, respectively). The improvement for avoidant behavior during the follow-up period was significantly larger compared to the improvement during the intervention period ($\Delta\chi^2 = 19.43$, $p < .001$). Children did not show an additional significant improvement on anxious behavior, approach behavior, positive thoughts, and perceived social threat, but intervention effects were sustained at follow-up.

Secondary Outcome Measures. Children in the EXP-condition significantly improved on internalizing behavior and self-perceived competence during the intervention period, and this improvement was significantly larger than children's non-significant change during the pre-intervention period ($\Delta\chi^2 = 6.25$, $p < .05$, and $\Delta\chi^2 = 8.39$, $p < .01$, respectively). Children's improvement on social skills was significant during both the pre-intervention period and the intervention period, however, the improvement during the intervention period was significantly larger ($\Delta\chi^2 = 14.23$, $p < .001$). Children significantly improved on self-efficacy during the intervention period, but this improvement was not significantly larger than the non-significant change in the pre-intervention period ($\Delta\chi^2 = 2.09$, $p > .05$). Children did not show an additional significant improvement on any of the secondary outcome measures during the follow-up period, but all intervention effects were sustained at follow-up.

Effectiveness of Cognitive Restructuring

Primary Outcome Measures. Children in the CR-condition significantly improved on all primary outcome measures during the intervention period. The improvements for social anxiety ($\Delta\chi^2 = 37.01$, $p < .001$), anxious behavior ($\Delta\chi^2 = 27.28$, $p < .001$), distress ($\Delta\chi^2 = 16.75$, $p < .001$), approach behavior ($\Delta\chi^2 = 15.30$, $p < .001$), positive thoughts ($\Delta\chi^2 = 11.31$, $p < .001$), and perceived social threat ($\Delta\chi^2 = 9.37$, $p < .01$) during the intervention period were significantly larger than the non-significant changes on these outcomes during the pre-intervention period. Children in the CR-condition also significantly improved on social anxiety during the pre-intervention period, however, improvement during the intervention period was significantly larger ($\Delta\chi^2 = 37.01$, $p < .01$). Children's improvement on avoidant behavior during the intervention period was significantly larger than children's significant worsening during the pre-intervention period ($\Delta\chi^2 = 19.27$, $p < .001$). Children did not show an additional significant improvement on any of the primary outcome measures during the follow-up period, but all intervention effects were sustained at follow-up.

Secondary Outcome Measures. Children in the CR-condition significantly improved on internalizing behavior, self-efficacy, and self-perceived competence during the intervention period. These improvements were significantly larger than the non-significant changes during the pre-intervention period ($\Delta\chi^2 = 9.57$, $p < .01$, $\Delta\chi^2 = 13.47$, $p < .001$, and $\Delta\chi^2 = 9.17$, $p < .01$, respectively). Although children's improvement for social skills was not significant during the intervention period, it was significantly larger than the non-significant change during the pre-intervention period ($\Delta\chi^2 = 4.89$, $p < .01$).

Children's self-perceived competence significantly improved further during the follow-up period. This improvement was significantly larger than children's improvement in self-perceived competence during the intervention period ($\Delta\chi^2 = 7.45$, $p < .01$). Children did not show additional significant improvement on internalizing or self-efficacy during the follow-up period, but intervention effects were sustained at follow-up.

Effectiveness of Combination Exposure and Cognitive Restructuring

Primary Outcome Measures. Children in the CM-condition significantly improved on anxious behavior, distress, and approach behavior during the intervention period. However, only children's improvement on distress was significantly larger than the non-significant change during the pre-intervention period ($\Delta\chi^2 = 6.04$, $p < .05$). Children's improvements on anxious behavior and approach behavior during the intervention period were not significantly larger than the non-significant changes during the pre-intervention period ($\Delta\chi^2 = 1.84$, $p > .05$, and $\Delta\chi^2 = 1.25$, $p > .05$, respectively). Children in the CM-condition did not significantly improve on social anxiety, avoidant behavior, positive thoughts, and perceived social threat. Children did not show additional significant improvement on the primary outcome measures, but the intervention effects were sustained at follow-up.

Secondary Outcome Measures. Children in the CM-condition significantly improved on internalizing behavior and self-efficacy during the intervention period. Children's improvement on internalizing behavior was significantly larger than the non-significant

change during the pre-intervention period ($\Delta\chi^2 = 4.55$, $p < .05$). Children's improvement on self-efficacy was not significantly larger than the non-significant change during the pre-intervention period ($\Delta\chi^2 = 1.58$, $p > .05$). Children did not significantly improve on social skills or self-perceived competence. Children did not show additional improvement on the secondary outcome measures, but intervention effects were sustained at follow-up.

Differences in Effectiveness Between the Intervention Conditions

To assess whether there were between-condition (i.e., EXP-, CR-, and CM-condition) differences concerning the changes during the intervention period and the follow-up period we compared a model that constrained these change periods to equality across the conditions with a model that estimated these changes for each condition separately. In Table 2, subscripts indicate significant differences between the conditions. Appendix D, Table D.3 presents the fit indices for the constrained models and chi-square difference tests.

Intervention Period Differences Between Conditions

Primary Outcome Measures. Children's significant improvements on social anxiety and perceived social threat during the intervention period were similar in the EXP-condition and the CR-condition, but children's significant improvement on social anxiety was significantly larger in the CR-condition than in the CM-condition ($\Delta\chi^2 = 5.30$, $p < .05$). Also, children's significant improvement on perceived social threat was significantly larger in the EXP-condition and the CR-condition than in the CM-condition ($\Delta\chi^2 = 4.76$, $p < .05$, and $\Delta\chi^2 = 4.17$, $p < .05$, respectively). There were no significant between-condition differences during the intervention period on anxious behavior, distress, avoidant behavior, approach behavior, and positive thoughts.

Secondary Outcomes. Children's significant improvement on social skills during the intervention period was significantly larger in the EXP-condition than children's non-significant change in the CM-condition ($\Delta\chi^2 = 4.44$, $p < .05$), but not significantly larger than children's non-significant change in the CR-condition ($\Delta\chi^2 = 1.32$, $p > .05$). There were no significant between-condition differences during the intervention period for internalizing behavior, self-efficacy or self-perceived competence.

Follow-Up Period Differences Between Conditions

Primary Outcome Measures. Children's significant improvement on avoidant behavior during the follow-up period was significantly larger in the EXP-condition than children's non-significant change in the CR-condition ($\Delta\chi^2 = 9.08$, $p < .01$), but not significantly larger than children's non-significant change in the CM-condition ($\Delta\chi^2 = .63$, $p > .05$). There were no significant between-condition differences during the follow-up period for social anxiety, anxious behavior, distress, approach behavior, positive thoughts, and perceived social threat.

Secondary Outcome Measures. Children's non-significant worsening of internalizing behavior during the follow-up period in the CM-condition was significantly different from children's non-significant improvement on internalizing behavior in the EXP-condition and CR-condition ($\Delta\chi^2 = 4.63$, $p < .05$, and $\Delta\chi^2 = 5.32$, $p < .05$, respectively). Children's

significant improvement in self-perceived competence was significantly larger in the CR-condition than in the EXP-condition ($\Delta\chi^2 = 4.42$, $p < .05$), but not significantly larger than in the CM-condition ($\Delta\chi^2 = .31$, $p > .05$). There were no significant between-condition differences in the follow-up period for self-efficacy and self-perceived competence.

Table 2. *Model Parameters for the Unconstrained Latent Change Models Controlling for Ethnicity Across Conditions.*

	Exposure				Cognitive restructuring				Combination			
	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}
Outcome	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*
Social anxiety	51.49*** (1.64)	-.39 (1.30)	**-6.71***** (1.37)$_b$	-2.79* (1.17)	50.03*** (1.72)	-5.90** (1.71)	**-8.88***** (1.63)	-2.13 (1.76)	51.25*** (2.44)	-1.98 (2.26)	-1.07 (2.88)$_a$	-3.05 (1.57)
Anxious behavior	15.26*** (.60)	1.02* (.46)	**-2.19***** (.51)	-.78 (.50)	13.81*** (.60)	-.06 (.64)	**-2.56*** (.52)	.21 (.57)	15.80*** (.97)	.94 (.55)	-1.94* (.80)	-.42 (.84)
Distress	15.02*** (.57)	.27 (.46)	**-2.01***** (.51)	-.98* (.43)	11.90*** (.61)	-.31 (.58)	**-2.44***** (.53)	.09 (.55)	15.35*** (.83)	-.04 (.64)	**-2.01*** (.80)	-.09 (.54)
Avoidant behavior	11.04*** (.58)	.27 (.45)	-1.16* (.47)	-1.30** (.37)$_a$	9.13*** (.48)	-.98* (.40)	**-1.35**** (.46)	.35$_a$ (.40)	11.93*** (.91)	1.14 (.66)	.73 (.75)	-.61$_b$ (.77)
Approach behavior	8.74*** (.53)	.08 (.40)	**.96**** (.36)	.56 (.38)	11.27*** (.46)	.36 (.85)	**1.82***** (.49)	-.12 (.36)	6.89*** (.74)	-.79 (.51)	1.59* (.63)	.22 (.52)
Positive thoughts	21.67*** (1.12)	.75 (1.02)	**2.72**** (.91)	.40 (.87)	23.94*** (1.12)	1.15 (1.01)	**3.13**** (1.06)	-.66 (.91)	22.08*** (1.79)	-.10 (.88)	.29 (1.05)	.51 (1.35)
Perceived social threat	20.08*** (.95)	-1.06 (.77)	**-2.18***$_a$ (.91)	-1.22 (.84)	21.17*** (1.10)	-1.17 (.95)	**-2.54***$_b$ (1.01)	-.83 (.98)	20.51*** (1.65)	.24 (.88)	.80$_{ab}$ (1.12)	-2.26 (1.63)
Internalizing behavior	21.09*** (.86)	-.51 (.66)	**-1.45*** (.72)	-1.09$_a$ (.84)	20.72*** (1.06)	-.44 (.91)	**-2.33*** (.99)	-1.39$_b$ (.86)	22.75*** (1.32)	-.18 (1.08)	**-2.76**** (.94)	2.73$_{ab}$ (1.49)
Self-efficacy	10.75*** (.46)	-.54 (.38)	1.16** (.40)	.73 (.40)	12.55*** (.46)	.34 (.40)	**1.54**** (.46)	-1.30 (.40)	9.77*** (.70)	-1.05 (.62)	1.89** (.58)	.35 (.40)
Social skills	140.36*** (2.24)	4.01* (1.76)	**4.95****$_a$ (1.54)	1.60 (2.31)	140.02*** (2.83)	3.49 (2.50)	**2.43**$_b$ (1.21)	2.43 (2.32)	135.30*** (3.43)	2.86 (1.78)	-2.81$_a$ (3.26)	2.53 (3.42)
Self-perceived competence	55.08*** (1.07)	.51 (.84)	**2.93***** (.85)	.34$_a$ (.87)	55.79*** (1.26)	1.90 (1.99)	**2.38*** (2.28)	9.52*$_a$ (4.18)	54.51*** (1.72)	1.54 (1.23)	1.23 (1.75)	2.19$_b$ (1.75)

Note. Intercept = pretest 1; Δ_{2-1} = pre-intervention period; Δ_{3-2} = intervention period; Δ_{4-3} = follow-up period. Latent means in bold differ from the within-group pre-intervention period at a $p < .05$. Latent means in the same row that share subscripts differ at $p < .05$.
$^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Discussion

This microtrial aimed to identify whether brief group interventions using exposure, cognitive restructuring, or both were effective in reducing social anxiety in children. We assessed changes in symptoms of social anxiety as well as in related outcomes that might change by proxy of the reduction of symptoms of social anxiety.

Effects of Exposure and Cognitive Restructuring as Single Intervention Components

Our findings show that both exposure and cognitive restructuring were effective in improving social anxiety and related outcomes. Exposure improved children's symptoms of social anxiety and all related outcomes measured, with the exception of self-efficacy. Cognitive restructuring also improved children's symptoms of social anxiety and related outcomes, with the exception of social skills. On the whole, our findings demonstrate that exposure and cognitive restructuring are similarly effective in reducing children's social anxiety and related outcomes, which is in line with findings from previous research (e.g., Feske & Chambless, 1995; Rodebaugh et al., 2004).

Both exposure and cognitive restructuring had positive effects on children's cognitions. Children reported more positive thoughts and perceived less social threat after the intervention—noteworthy given the fact that only cognitive restructuring paid explicit attention to children's cognitions. Exposure might elicit self-administered cognitive restructuring (Rodebaugh et al., 2004), and the exposure exercises might have served as expectancy violation exercises by disconfirming children's expectation of negative evaluation (Bouton, 2002; Craske et al., 2014). In this way, exposure may cause children to adjust their unhelpful thoughts without explicitly focusing on the negative cognitions themselves. This implies that there is a possibility to improve children's cognitions within a four-week exposure-based intervention. If exposure is effective in improving children's self-perceptions—as our findings suggest—this relatively easy to execute component could be used to prevent the development of maladaptive thoughts in at-risk children. This is important, given that research has shown that negative self-perceptions mediate the longitudinal relationship between shyness and social anxiety (Blöte et al., 2019).

The structure of the exposure and cognitive restructuring intervention modules might explain their similar effect on many outcome measures. As well as teaching children to adjust their unhelpful thoughts, the cognitive restructuring intervention might also prompt an imaginal exposure by instructing children to visualize hypothetical social situations. This mechanism was previously found in research with adults with post-traumatic stress disorder: visualizing a situation yielded a significant change in anxiety levels (Bryant et al., 2003). The possibility that exposure exercises prompt children to engage in self-administered cognitive restructuring may suggest that it is impossible to rule out non-targeted components in separate component interventions; there might be some cognitive restructuring in an exposure-only intervention and vice versa.

However, there was a differential effect of the exposure and cognitive restructuring components on several outcome measures. Unlike exposure, cognitive restructuring did not improve children's social skills, which might be due to the focus on cognitions. While exposure is focused more "outward" towards behavior, cognitive restructuring is focused more "inward" towards the child's inner world, and this may make a difference to improving social skills. Children may specifically need to enact social situations that provoke anxiety and need to practice to improve their social skills—which was the case in the exposure intervention but not the cognitive restructuring condition. Another difference between the effects of the components was that exposure did not improve children's self-efficacy, whereas cognitive restructuring did. Our findings also show that cognitive restructuring was more effective in increasing children's positive thoughts, and this increase in positive thinking may be instrumental to the improvement in self-efficacy (i.e., children's prediction of how well they will perform certain tasks). Also, children's belief in their ability to restructure unhelpful thoughts and thereby control their emotions in anxious situations may increase their self-efficacy (e.g., Goldin et al., 2012).

The positive effects of both exposure and cognitive restructuring were sustained until the three-month follow-up on all outcomes where an intervention effect was found. Exposure continued to have an effect on social anxiety, distress, and avoidance of social situations up to three months after the intervention ended, and cognitive restructuring continued to have an effect on self-perceived competence up to three months after the intervention ended. In contrast to these sustained effects during the follow-up period, our findings suggest that the effect of exposure on avoidant behavior needs time to 'internalize', as positive effects of the intervention only emerged in the follow-up period. Thus, avoidance of social situations may not improve immediately, parallel to reductions in social anxiety, but rather may improve only after changes in social anxiety symptoms and distress have been established.

Effectiveness of a Combination of Exposure and Cognitive Restructuring

An important finding of the present microtrial is that a combined intervention was less effective to prevent social anxiety than either exposure or cognitive restructuring components alone, which is in line with previous research (e.g., Rodebaugh et al., 2004). This suggests that stacking multiple intervention components may not necessarily yield greater intervention benefit. In fact, our findings actually suggest that compared to a combined intervention, cognitive restructuring was superior in reducing children's social anxiety, that both exposure and cognitive restructuring outperformed the combined intervention in reducing children's perceived social threat, and that exposure outperformed the combined intervention in increasing children's social skills. It may be that each component needs to be administered in a certain minimum dosage and that a combination of exposure and cognitive restructuring might only be effective when the separate components are implemented in the right dosage. The combination intervention included fewer exposure exercises and fewer cognitive restructuring exercises than the time-equal separate interventions, which may explain the apparent absence of effects for the combined intervention. We cannot rule out that a combination of exposure and cognitive restructuring would have an additive positive effect on social anxiety symptoms

when both components are implemented in a higher dose; four sessions might be too few to implement both exposure and cognitive restructuring sufficiently.

Limitations and Suggestions for Future Research

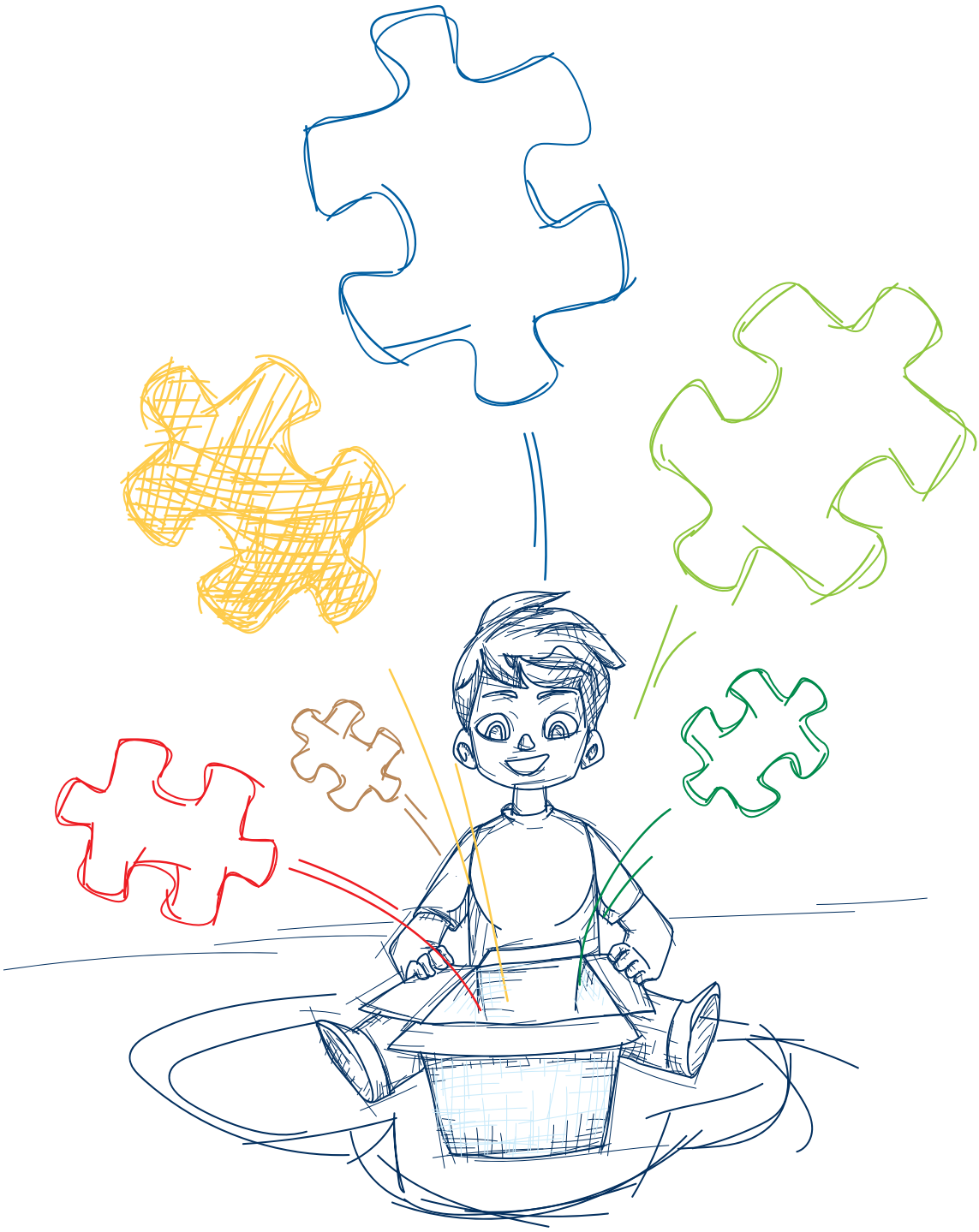
The present study is not without limitations. First, all outcomes were assessed with self-report measures. Although this is common in anxiety research, including parent-reports, teacher-reports and observations could have provided a more comprehensive assessment of the children's social anxiety in different contexts (Silverman & Ollendick, 2005). Second, it was beyond the scope of this study to assess the effects of common factors of interventions, but factors such as the trainer-child relationship may also play an essential role in the effectiveness of social anxiety interventions (e.g., Shirk & Karver, 2003). Third, there was an uneven distribution of participants across the conditions. The workload of primary school teachers is high in the Netherlands and, as a result, many schools were reluctant to participate in a study with multiple measurement occasions. Only a few schools that were randomized into the combination condition agreed to participate, and thus only a small number of children participated in the combined condition. We could not include a no-treatment control group for similar reasons.

Future research using a microtrial approach might include multiple informants and include observational data to assess the moderating effects of common factors such as working alliance and client and/or therapist motivation, a more evenly distributed sample, and a no-treatment control group. Future research might also evaluate the effectiveness of other components frequently included in social anxiety interventions, such as relaxation and problem-solving. Furthermore, it was beyond the scope of this study to assess subgroup variability in the effectiveness of intervention components. A child's level of behavioral inhibition before the intervention (e.g., Clauss & Blackford, 2012) or the use of safety behaviors such as avoiding eye contact (e.g., Blakey & Abramowitz, 2016) may also influence intervention effectiveness. Insight into what works for whom in terms of indicated prevention interventions could be valuable to better tailor interventions to a child's individual needs.

These limitations notwithstanding, this study was the first to assess components of social anxiety interventions separately, and our findings provide valuable information about separate and combined effects of exposure and cognitive restructuring. Due to the use of two pretest measurements, we could compare pre-post intervention effects to children's natural development before the implementation of the intervention, and this provides stronger conclusions regarding intervention effects. Including a follow-up measurement allowed us to assess the sustainability of intervention effects, and including multiple outcome measures related to social anxiety provided a detailed picture of the effectiveness of the interventions.

Our findings have several practical implications, the most important one being that a relatively brief, four-week intervention could protect children from developing clinical levels of social anxiety and associated negative consequences. Because we found the

stand-alone exposure and cognitive restructuring approaches to be effective, we conclude that practitioners can safely focus on either exposure or cognitive restructuring alone if there is little time for a multi-component intervention. Our study provides preliminary evidence that exposure might be the most valuable component in terms of the breadth of intervention effects, although cognitive restructuring yielded positive effects too. From a prevention perspective, the effectiveness of short-term intervention modules is advantageous because they are easy to implement. The modules implemented for this study were highly structured, and so future implementation by teachers could be feasible. Moreover, the regular school curriculum could integrate intervention module exercises, which could make addressing elevated social anxiety in children more cost-effective, and less burdensome for both children and parents as it could reduce the need to visit clinical childcare facilities.



CHAPTER 4

Do cognitive restructuring and psychophysical exercises enhance children's self-esteem? A microtrial into intervention components.

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Abstract

The present study examined the effectiveness of separate components—cognitive restructuring and psychophysical exercises—of an intervention aimed at improving children's self-esteem. The effects of these components were compared to each other and a no-treatment control condition. To this end, we used a three-arm microtrial with four repeated measures (i.e., pretest 1, pretest 2, posttest, and follow-up), and our sample consisted of 186 eight-to-thirteen-year-old children (M = 10.66, SD = 1.01) from regular Dutch primary schools. Our findings show that neither the cognitive restructuring component nor the psychophysical component had immediate effects on children's self-worth, self-perceived competence, self-efficacy, automatic thoughts, social skills, or assertiveness. However, cognitive restructuring exercises—but not psychophysical exercises—did have delayed effects on self-perceived competence and automatic thoughts which suggests that it takes time for the positive effects of cognitive restructuring to emerge.

Do cognitive restructuring and psychophysical exercises enhance children's self-esteem? A microtrial into intervention components.

Self-esteem is a cognitive construct that reflects an individual's subjective evaluation of worth and ability; it is one's judgment about being good or valuable. Self-esteem is composed of evaluations of our characteristics, experiences, talents, and achievements. Self-esteem can be boosted or hurt by feedback from others, and changes in self-evaluations are generally accompanied by positive or negative emotions (Leary & Baumeister, 2000; Pyszczynksi et al., 2004). How individuals think about themselves regulates interpersonal and intrapersonal behavior and facilitates psychological adjustment (Baumeister et al., 2003). Low self-esteem is recognized as a symptom of psychopathologies, such as loneliness, depression and (social) anxiety disorder (Fordham & Stevenson-Hinde, 1999; Sowislo & Orth, 2013; Trzesniewski et al., 2006,), and is associated with drug and alcohol abuse, and delinquency (Haney & Durlak, 1998). In contrast, high self-esteem is related to social competence and peer acceptance (Donders & Verschuren, 2004; Shirk et al., 2006), the ability to express feelings and needs, resilience to stress and ability to cope with life's challenges (Dumont & Provost, 1999), and overall happiness (Baumeister et al., 2003). Consequently, preventing low self-esteem is widely perceived as an essential societal goal (Orth & Robins, 2014; Speed et al., 2018).

Preventive interventions can target social-emotional skills to counter the negative influence low self-esteem may have on children's and adolescents' development. A meta-analysis showed that child-targeted interventions aimed at enhancing self-esteem had a small effect on children's self-esteem and self-concept (Cohen's *d* = .27; Haney & Durlak, 1998). Especially universal interventions (i.e., aimed at children not necessarily presenting with psychosocial problems) had negligible effects on children's self-esteem and self-concept (Cohen's *d* = .09) compared to indicated-prevention or treatment programs (Cohen's *d* = .47). Noteworthy, self-esteem improved most when it was targeted directly through improving self-perception (Cohen's *d* = .57) instead of indirectly through other skills, such as social or academic skills (Cohen's *d* = .10; Haney & Durlak, 1998). O'Mara et al. (2006) replicated both of these findings.

Intervention Components That May Enhance Self-Esteem

Interventions that target children's self-esteem generally include multiple components to enhance social and emotional skills. Two components that are often included—and that might increase children's self-esteem—are cognitive restructuring exercises and psychophysical exercises.

Cognitive Restructuring Exercises

Cognitive restructuring teaches individuals to identify, evaluate, and modify negative and self-defeating thoughts which are expected to contribute to low self-esteem (Clark, 2013). Self-esteem is thought to improve by changing negative self-schemas—like overgeneralization (e.g., "Nobody likes me") or all-or-none thinking (e.g., "Performing badly on this exam will prove I am a failure")—into more positive conceptions (Shirk et al., 2006).

Cognitive-behavioral therapies are potentially effective in increasing self-esteem in clinically depressed adolescents (e.g., Taylor & Montgomery, 2007). Cognitive therapies have also shown positive effects on self-esteem in children with social anxiety (d = .99; e.g., Taylor et al., 1997) and behavioral problems (e.g., Wanders et al., 2008). Less evidence is available for the effectiveness of cognitive restructuring in children without clinical behavioral problems. However, a recent meta-analysis found that non-clinical childhood interventions targeting self-esteem—which typically include a cognitive component—had a small, positive effect (d = .29) on outcomes such as self-efficacy, self-awareness, and self-esteem (de Mooij et al., 2020).

Psychophysical Exercises

Psychophysical exercises use body movement to stimulate the development of children's social and emotional skills (de Graaf et al., 2016). The implementation of psychophysical exercises is grounded in the embodied cognition theory (Glenberg et al., 2013), and interventions applying this approach are predominantly non-verbal (as opposed to mostly verbal cognitive-behavioral interventions; Röhricht, 2009). The embodied cognition theory assumes that specific bodily actions influence cognitions and can consequently strengthen self-awareness and self-esteem (Glenberg et al., 2013). To illustrate, standing up straight or making a fist has been related to feeling more pride and power (Schubert & Koole, 2009; Stepper & Strack, 1993). Bodily feedback can thus influence how individuals think and feel. Research also found that physical activity (e.g., sport, dance, or physical education) had a small to moderate, positive effect on children's and adolescents' self-esteem (Dale et al., 2019; Liu et al., 2015). Interventions that use body movement have shown to improve well-being, anxiety symptoms, and social insecurity in adults with mental disorders or physical health problems (e.g., schizophrenia, anorexia nervosa, and breast cancer patients; Röhricht, 2009). A meta-analysis demonstrated that martial arts interventions were effective in reducing children's externalizing behavior (Harwood et al., 2017), and physical activity interventions have been found to improve children's academic outcomes (Singh et al., 2019).

Although these findings suggest that interventions that include body movement yield effects on various outcomes, to our knowledge, there is little evidence for the effectiveness of psychophysical exercises as a separate intervention component to enhance children's self-esteem. A randomized pre-post design trial recently showed that a psychophysical intervention yielded a positive but negligible effect (Cohen's d = .14) on children's global self-worth (Reitz et al., 2019). A recent meta-analysis indicated that psychophysical exercises were not related to improvements in social and emotional skills (de Mooij et al., 2020).

Assessing the Effectiveness of Separate Intervention Components

The evidence on effectiveness of interventions including cognitive restructuring or psychophysical exercises mostly comes from studies of complete intervention packages. As a result, determining if either component drives intervention effects on children's self-esteem is challenging (Chorpita et al., 2005a). This study used a microtrial approach (i.e., a brief randomized experiment, Howe et al. 2010; Leijten et al., 2015) to assess if the

cognitive restructuring and psychophysical component are each effective intervention components in enhancing children's self-esteem. In this way, findings can contribute to evidence-based practice, for example, by helping practitioners choose which manualized programs to implement, as well as aid the development of leaner, more specific childhood interventions aimed at improving self-esteem (Chorpita et al., 2007).

We aimed to answer three questions in this study: (i) Is a brief group intervention with cognitive restructuring exercises effective in enhancing children's self-esteem?; (ii) Is a brief group intervention with psychophysical exercises effective in enhancing children's self-esteem?; (iii) Is there a difference in effectiveness between a brief group intervention with psychophysical exercises and with cognitive restructuring exercises?

We expected both components to outperform a no-treatment control condition. Furthermore, we expected the cognitive restructuring component to outperform the psychophysical component in enhancing children's overall self-esteem, as it targets self-esteem more directly. Previous studies have shown directly targeting self-esteem to be most beneficial (Haney & Durlak, 1998, O'Mara et al., 2006).

Our study focused on eight-to-twelve-year-old children. A recent review (Gorrese & Ruggieri, 2013) suggested that children formulate more accurate self-appraisals (e.g., their appraisals shift from being domain-specific to more global evaluations) as they mature cognitively. Children's appraisals become more realistic as they age, and as a consequence, their self-esteem gradually declines. This decline starts in late childhood (at around nine years of age) and continues into late adolescence (Gorrese & Ruggieri, 2013; Robins & Trzesniewski, 2006). It thus makes sense to aim prevention efforts at children who are just starting to experience a decline in self-esteem. Also, negative self-evaluations may be less entrenched in our younger years, and it may be beneficial to attend to negative self-views before these become deep-rooted.

Method

Participants

Our sample consisted of 186 children attending 21 Dutch primary schools. The participants were in grades four to six, had an average age of 10.66 years (*SD* = 1.01, range 8.50 to 13.00 years), and about half of the sample was female (51.1%, *n* = 95).

Following the definition of the Dutch Bureau for Statistics (n.d.), we defined children's ethnicity as follows: 66.5% (*n* = 121) had a Western origin (57.5% Dutch, 9.7% other) and 33.5% (*n* = 61) had a Non-Western origin (4.3% Turkish, 6.5% Moroccan, 9.1% Surinamese/Antilles, 10.8% other). Four participants did not disclose their ethnicity.

Design

Schools were randomized into one of three conditions: (i) a cognitive restructuring condition ($N_{schools}$ = 8), (ii) a psychophysical condition ($N_{schools}$ = 8), or (iii) a no-treatment control condition ($N_{schools}$ = 6; hereafter: control condition). We included four measurement occasions: approximately five weeks before the start of the intervention (i.e., pretest 1); one week before the start of the intervention (i.e., pretest 2); one week after the intervention had ended (i.e., posttest); approximately three months after the intervention had ended (i.e., follow-up). Including two pretest measurements allowed us to assess the within-group effects of the intervention components. An a priori power analysis indicated that we required 52 participants per condition to identify a moderate effect of d = .40, with a power of .80 and an alpha of .05 (two-sided). The Ethics Review Board of the University of Amsterdam approved this study (2017-CDE-8097).

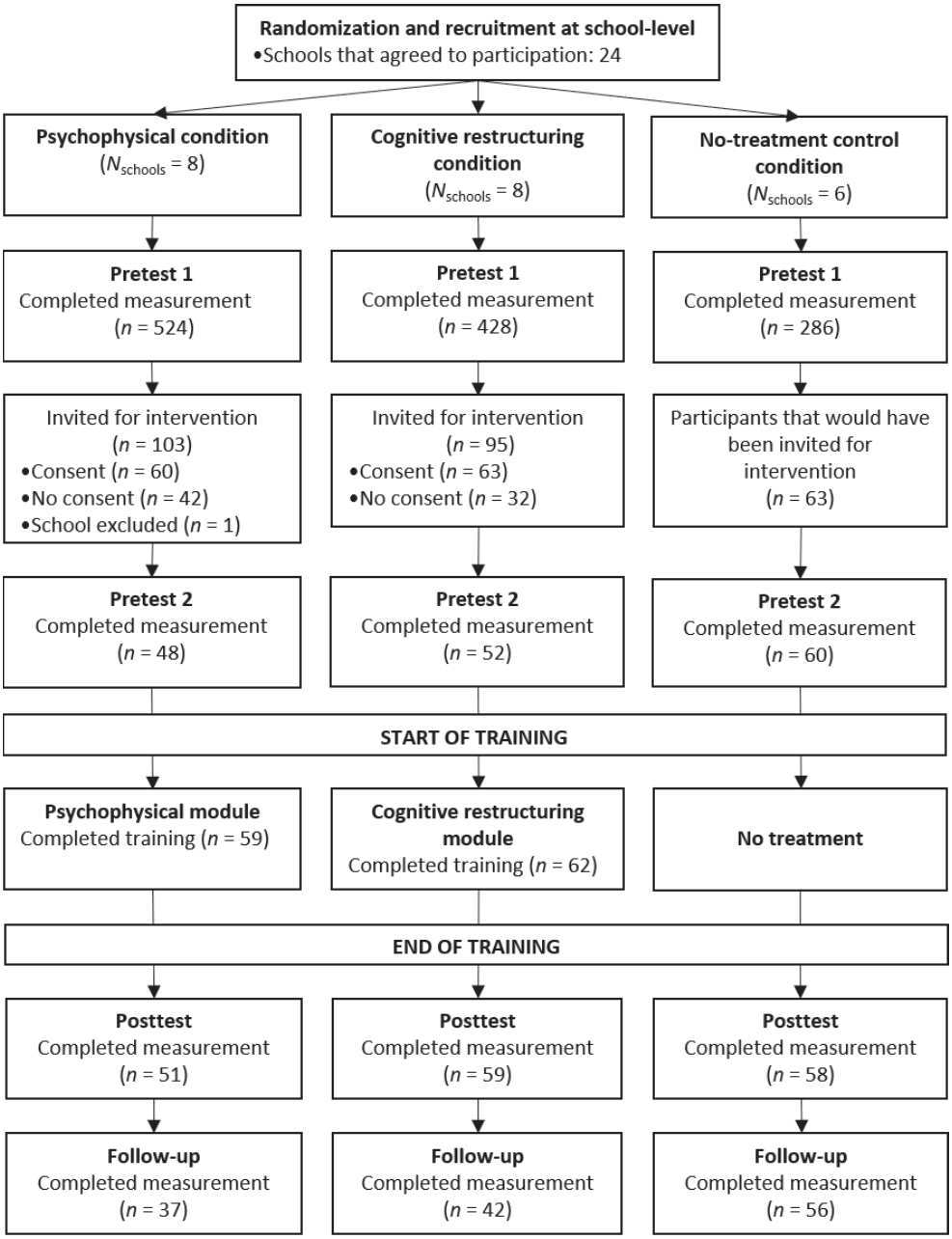
Sampling Procedure

Schools were selected from the database of the school social work organization that collaborated in this study. Schools were invited to participate if they provided regular primary education and had a sufficiently large school size (i.e., at least 50 children in the top three grades). Before randomization, we matched schools on their size and the indication of the education level in the schools that students continue onto after primary school.

Between May 2017 and August 2017, we invited 63 schools (21 in each condition) to participate in the study, 15 of which agreed to participate. Seven schools completed the first measurement in September 2017 (cohort A), and seven schools completed the first measurement in January 2018 (cohort B). We recruited new schools between May 2018 and August 2018 through an advertisement in a Dutch national magazine for school counselors to achieve sufficient power. Another nine schools agreed to participate in the study and completed their first measurement in September 2018 (cohort C). Schools in the cognitive restructuring or psychophysical condition received 50 euros compensation, and schools in the control condition received 150 euros compensation.

Before pretest 1, two schools (one in each experimental condition; see Figure 1 for the participant flowchart) discontinued their participation due to the high workload at the school or too few students with consent to participate in the first measurement occasion. The final sample consisted of 21 schools and 186 children: 63 in the cognitive restructuring condition, 60 in the psychophysical condition, and 63 in the control condition.

Figure 1. *Participant Flowchart.*



Procedure

All parents were informed about the study and were provided the opportunity to opt their children into the study. The first measurement served as pretest 1, and as the screening for the intervention in the experimental conditions. We visited all participating schools on the first measurement occasion to explain the goal of the study to students and to supervise the completion of the measurement occasion. We did not tell students in the experimental conditions that we would use the first measurement to select participants for intervention to avoid drawing negative attention to potential participants. In all schools, students without consent to participate in the study remained in the classroom and worked on individual tasks.

In the experimental conditions, students were eligible for the intervention if they scored in the lowest 20% on self-perceived competence (Self-Perception Profile for Children [SSPC]; Veerman et al., 1997) and assertiveness (subscale Assertiveness of the Social Skills Inventory System-Rating Scales [SSIS-RS]; Gresham & Elliott, 2008) of their class.

Next, school personnel was provided the opportunity to review the selected students. In one school, a selected child was already enrolled in a different social-emotional skills program. In another school, a number of the selected children did not have low self-esteem in the school counselor's opinion, who therefore did not feel that intervention was necessary. In these cases, school personnel proposed alternative children for the intervention. The SPPC and SSIS-RS-Assertiveness scores of children suggested by school personnel had to be below the class mean to participate in the intervention. School personnel supervised the pretest 2, posttest, and follow-up measurement occasions. Data for this study were collected between September 2017 and April 2019.

Measures

Primary Outcome Measures

Self-Worth. Global self-worth was assessed using the Dutch version of the Rosenberg Self-Esteem Scale (RSES; Franck et al., 2008), which is a one-dimensional scale consisting of five positively worded items and five negatively worded items that are rated on a four-point scale (*1 = not at all true* to *4 = very true*). An example item is "I am good at some things.". The items were recoded for a higher score to reflect greater self-worth. The sum score of the items comprised the total score (i.e., composite score ranges from 10 to 40). In this sample, reliability was satisfactory across measurement occasions (α = .69 to .77).

Self-Perceived Competence. Self-perceived competence was measured using the Dutch translation (Veerman et al., 1997) of the Self-perception Profile for Children (SPPC; Harter, 1985), which is scale that assesses domain-specific self-evaluations. We included subscales Social acceptance, Behavioral conduct, and Global self-worth (18 items in total). Originally items consisted of two conflicting statements, and participants indicated how accurate the best fitting statement is for them. To simplify the items and make them more consistent with the other measures, we reformulated items and answering categories. An example item is "I have a hard time making friends.". Items were answered on a four-

point scale (*1 = not true at all* to *4 = very true*), and the sum score of the items comprised the scale score (i.e., composite score ranges from 18 to 72). In this study, reliability was good across measurement occasions (α = .86 to .88).

Self-Efficacy. General self-efficacy was measured using the Dutch adaptation of the General Self-Efficacy Scale (GSES; Teeuw et al., 1994). The GSES measures whether children believe they can successfully deal with challenging situations. An example item is "I can solve most problems if I put in enough effort.". This 10-item measure is answered on a four-point scale (*1 = not at all true* to *4 = very true*). A higher score reflects greater general self-efficacy. The sum score of the items comprised the total score (i.e., composite score ranges from 10 to 40). In this sample, reliability was good across measurement occasions (α = .81 to .86).

Secondary Outcome Measures

Automatic Thoughts. Automatic thoughts (i.e., non-conscious self-statements) were measured using the Children's Automatic Thoughts Scale-Negative/Positive (CATS-N/P; Hogendoorn et al., 2010). We used subscales Perceived social threat (e.g., "Children will laugh at me.", 10 items), and Positive thoughts (e.g., "I am a go-getter.", 10 items). The items were answered on a five-point scale (*1 = never* to *5 = always*) and the sum score across the items comprised the outcome Automatic thoughts (i.e., composite score ranges from 20 to 100). A high score reflected a high perceived social threat and a low level of positive thoughts. The CATS-N/P has satisfactory internal consistency and test-retest reliability (Hogendoorn et al., 2010; Hogendoorn et al., 2012). In this study, reliability was good across measurement occasions (α = .92 to .93).

Social Skills. Social skills were measured using the Dutch translation (van den Heuvel et al., 2017) of the Social Skills Improvement System-Rating Scales (SSIS-RS; Gresham & Elliot, 2008). This measure includes multiple scales measuring aspects of social skills. Items are rated on a four-point scale (*1 = not at all true* to *4 = very true*). The sum of the scores on the subscales Cooperation (e.g., "I pay attention when others present their ideas.", 7 items), Communication (e.g. "I say 'please' when I ask for things.", 6 items), Responsibility (e.g., "I have good manners.", 7 items), Empathy (e.g., "I try to forgive others when they apologize.", 6 items), Engagement (e.g., "I get along with other children.", 7 items) and Self-control (e.g., "I stay calm when I am teased.", 6 items.) formed the outcome variable Social skills (i.e., composite score ranges from 39 to 156). The English version of the SSIS-RS has shown good reliability (Gresham et al., 2011). In this study, reliability was good across measurement occasions (α = .90 to .99).

Assertiveness. Assertiveness was measured using subscale Assertion from the SSIS-RS. This subscale included seven items, such as "I ask for information when I need it.". These items were also rated on a four-point scale (*1 = not at all true* to *4 = very true*). The sum score of the items comprised the scale score (i.e., composite score ranges from 7 to 28). In this study, reliability was satisfactory across measurement occasions (α = .55 to .95).

Interventions

We adapted two Dutch group-based self-esteem interventions for this study: the I See...I See YOU! program (Schoolformaat, n.d.), and the Rock and Water program (Ykema, 2014). From these programs, we distilled single interventions consisting exclusively of either cognitive restructuring exercises or psychophysical exercises. We adapted the cognitive restructuring and psychophysical interventions in collaboration with four experienced youth care professionals throughout several meetings. The exercises that made up the newly developed interventions were discussed and modified to fit the purpose of this study. The interventions were then extensively reviewed to guarantee the appropriateness for the target audience and employability.

Both the cognitive restructuring intervention and psychophysical intervention (i) consisted of four one-hour sessions, (ii) were provided by certified, professional trainers, (iii) were implemented during school hours outside of the classroom, and (iv) were implemented in groups of eight to ten children, with children from grades four to six mixed in an intervention group. The cognitive restructuring intervention was provided by two certified trainers, with six and 11 years of professional experience, respectively. The psychophysical intervention was provided by three Rock and Water-certified trainers with three to six years of professional experience. Appendix A, Table A.1. provides a summary of the interventions.

Cognitive Restructuring Intervention

The cognitive restructuring intervention was an adaptation of the Dutch I See...I See YOU!-program (Schoolformaat, n.d.), a group intervention that aimed to teach children to be more aware of their behavior and how their behavior influences others to create a positive class environment. The program targets elementary school children and consists of ten one-hour group sessions (Schoolformaat, n.d.). We extracted the exercises aimed at boosting children's self-esteem for the cognitive restructuring intervention. The exercises teach children about the different types of thoughts they can have and how to recognize these thoughts. Additionally, the cognitive restructuring exercises taught children how thoughts, emotions, and behavior affect each other, and how to transform negative thoughts into positive, helpful thoughts using an action plan (Clark, 2014). The intervention also addressed giving and receiving compliments and being aware of individual qualities.

Psychophysical Intervention

The psychophysical intervention was an adaption of the Dutch version of the Rock and Water program (Ykema, 2014). which is a resilience and anti-bullying program that aims to improve social skills and self-esteem using martial arts-inspired physical exercises (de Graaf et al., 2016). The program consists of ten group sessions that are taught by a Rock and Water-certified trainer. The program is suitable for children between 4 and 18 years old and can be implemented school-wide (Ykema, 2014). We extracted several exercises aimed at boosting children's self-esteem and resilience (i.e., so-called Rock-exercises) for the psychophysical intervention. These exercises focused on standing firmly, using breathing techniques to control emotions, setting and communicating boundaries, working as a team, and trusting others. All these topics were addressed using various physical exercises.

Statistical Analyses

Before the analyses, we selected children from the control condition scoring in the lowest 20% of their class distribution on the SSPC and SSIS-RS-Assertiveness (see "Procedure") to create a comparable control group. We answered the research questions using latent change models (LCMs) in M*plus* version 7.31 (Muthén & Muthén, 1998-2015). Compared to the analysis of variance approach, the LCM approach has more power to detect intervention effects and is robust against nonnormality (Muthén, & Curran, 1997). All analyses were intention-to-treat, and models were fit using full information maximum likelihood (e.g., Raykov, 2005), which makes optimal use of available information.

We evaluated LCMs using multigroup analysis to examine the changes in the outcome variables in the three conditions. We based our models on the model described by Schmidt et al. (2014). A model with pretest 2 as the reference point (i.e., intercept) allowed us to assess changes in children's self-reported behavior from pretest 1 to pretest 2 (hereafter the pre-intervention period), and from pretest 2 to posttest (hereafter the intervention period). An equivalent model with posttest as the intercept allowed us to assess the changes from posttest to follow-up (hereafter follow-up period). See Appendix B, Figure B.1 for an illustration of our model. We used chi-square statistics, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI; Hu & Bentler, 1999) to evaluate model fit.

The effects of the cognitive restructuring intervention and the psychophysical intervention on each of the outcome variables were examined by constraining the changes in the pre-intervention period and the intervention period to equality within conditions. Next, we compared the cognitive restructuring condition and the psychophysical condition to the control condition by constraining parameters to equality across conditions. To compare the cognitive restructuring condition to the psychophysical condition, the change parameters were constrained to equality across these two conditions. The fit of the constrained models was then compared to the fit of unconstrained models using chi-square difference tests. A significant chi-square difference indicated that the constrained parameters were significantly different, thus meaning there was a significant difference between the constrained parameters. M*plus* syntax for the unconstrained and constrained LCMs is available in Appendix B.

Results

Preliminary Analyses

Independent *t*-tests and chi-square analyses indicated that participants in the cognitive restructuring condition (CR-condition in this section), psychophysical condition (PSY-condition in this section), and control condition did not differ in age (F [2, 184] = .285, p = .75), sex (χ^2 [2, N = 186] = .01, p = .99) or on any of the outcome variables at pretest 1. The analyses did indicate that the control condition contained significantly fewer participants of non-Western origin (19%) than the CR-condition (22%), and the PSY-condition (27%;

χ^2 [2, N = 182] = 10.11, p < .01). We controlled for cohort membership and ethnicity in further analyses.

Table 1 presents the descriptives for all study variables. Bivariate correlations indicated that higher self-worth was associated with higher self-perceived competence and self-efficacy (*r*s .71 and .41, respectively, *p*s < .05), but not with social skills and assertiveness. Assertiveness did not significantly correlate with self-perceived competence or automatic thoughts at pretest 1, and social skills did not significantly correlate with automatic thoughts at pretest 1. Self-worth, self-perceived competence, self-efficacy, social skills, and assertiveness had a weak to strong correlation at pretest 2 (*r*s ranged from .29 to .80, *p*s < .05), posttest (*r*s ranged from .35 to .67, *p*s < .05) and follow-up (*r*s ranged from .35 to .68, *p*s < .05).

As expected, positive outcomes (i.e., self-worth, self-perceived competence, self-efficacy, social skills, and assertiveness) inversely correlated with negative outcomes (i.e., automatic thoughts) at pretest 2 (*r*s ranged from -.21 to -.84), posttest (*r*s ranged from -.02 to -.84), and follow-up (*r*s ranged from -.23 to -.79). Appendix C, Tables C.1, and C.2 present the full correlation matrices for all measurement occasions.

Table 1. *Means (M) and Standard Deviations (SD) for the Primary and Secondary Outcome Measures.*

	Psychophysical condition				Cognitive restructuring condition				Control condition			
	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up
Outcome	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Self-worth	17.40 (6.71)	17.43 (6.74)	20.71 (6.47)	20.68 (7.12)	18.36 (6.65)	19.20 (6.94)	21.74 (6.09)	24.00 (5.31)	18.55 (6.46)	20.19 (7.49)	22.20 (7.50)	22.21 (7.71)
Self-perceived competence	48.57 (11.56)	50.74 (9.29)	53.51 (10.54)	52.74 (11.14)	49.30 (8.82)	53.41 (9.68)	56.33 (9.16)	59.41 (8.98)	51.82 (9.28)	55.10 (10.79)	57.25 (10.37)	57.99 (10.61)
Self-efficacy	24.39 (6.20)	24.74 (4.83)	27.25 (5.65)	25.91 (6.12)	24.49 (5.02)	25.75 (4.94)	27.39 (6.79)	29.39 (5.58)	26.16 (4.16)	26.93 (5.10)	27.82 (6.22)	27.56 (6.18)
Automatic thoughts	54.75 (18.65)	50.67 (14.70)	46.45 (16.97)	49.47 (17.59)	53.63 (14.90)	49.60 (15.27)	44.86 (13.18)	38.44 (13.21)	49.47 (13.66)	45.03 (15.22)	42.10 (15.67)	43.55 (16.36)
Social skills	112.14 (15.54)	109.90 (14.52)	115.86 (18.58)	109.69 (18.16)	112.97 (15.77)	118.14 (14.32)	119.27 (16.16)	122.60 (17.69)	113.85 (12.12)	115.49 (13.91)	117.84 (16.86)	118.22 (15.66)
Assertiveness	17.93 (3.29)	17.40 (3.91)	18.93 (3.89)	18.21 (3.65)	17.59 (3.54)	18.99 (3.40)	19.89 (3.52)	20.75 (3.78)	17.86 (2.82)	18.62 (3.55)	19.70 (3.56)	19.60 (3.33)

Effectiveness of the Cognitive Restructuring and Psychophysical Component

We examined the effectiveness of the separate intervention components using unconstrained multigroup latent change models (LCMs). The fit indices were adequate for LCM analyses on self-worth, self-efficacy, and self-perceived competence ($\chi^{2,}$ *p*s= ns, RMSEA < .06, CFI > .95). The LCM analyses on automatic thoughts, social skills, and assertiveness showed elevated RMSEA-values. We still moved forward with these models because evidence points to the RMSEA performing poorly with few degrees of freedom (Kline, 2016), and all other fit indices indicated adequate fit. Appendix D, Table D.1 presents all fit statistics.

Table 2 presents parameter estimates for all LCMs. Parameters displayed in bold font indicate a significant within-condition difference between the pre-intervention period and the intervention period parameter. Subscripts that are equal indicate a significant difference between conditions. Appendix D, Tables D.2 and D.3 present the complete fit indices of the constrained LCMs used to examine within-condition and between-condition differences.

Changes in the Cognitive Restructuring Condition

Changes During the (Pre-)Intervention Period. Children in the CR-condition significantly improved on self-worth during the intervention period, and this improvement was significantly larger than the non-significant change during the pre-intervention period ($\Delta\chi^2 = 4.29$, $p < .05$). Children also significantly improved on self-perceived competence and automatic thoughts during the intervention period. However, these improvements were significantly smaller than the significant improvement in these outcome variables already observed during the pre-intervention period ($\Delta\chi^2 = 23.22$, $p < .001$, and $\Delta\chi^2 = 13.88$, $p < .01$). Children did not significantly improve on self-efficacy, social skills, and assertiveness during the intervention period.

Changes During the Follow-up Period. During the follow-up period, children in the CR-condition significantly improved on self-worth, self-perceived competence and automatic thoughts. Children's improvement on self-worth was significantly smaller than children's significant improvement during the intervention period ($\Delta\chi^2 = 15.50$, $p < .001$). Children's improvement on self-perceived competence and automatic thoughts during the follow-up period was significantly larger than the significant change during the intervention period ($\Delta\chi^2 = 15.72$, $p < .001$, and $\Delta\chi^2 = 13.25$, $p < .001$ respectively).

Changes in the Psychophysical Condition

Changes During the (Pre-)Intervention Period. Children in the PSY-condition did not significantly improve on any of the outcomes during the pre-intervention period and the intervention period.

Changes During the Follow-Up Period. During the follow-up period, children in the PSY-condition significantly improved on self-worth, and this improvement was significantly larger than the non-significant change during the intervention period ($\Delta\chi^2 = 4.29$,

$p < .05$). There were no sustained or additional intervention effects on self-perceived competence, self-efficacy, automatic thoughts, social skills, or assertiveness during the follow-up period.

Changes in the Control Condition

Children in the control condition significantly improved on self-perceived competence and automatic thoughts from pretest 2 to posttest (i.e., the intervention period for the experimental conditions), and these improvements were significantly larger than the non-significant changes from pretest 1 to pretest 2 (i.e., the pre-intervention period for the experimental conditions). Children significantly improved on self-worth, social skills, and assertiveness from pretest 1 to pretest 2. For self-worth and assertiveness, these improvements were significantly larger than the non-significant changes from pretest 2 to posttest ($\Delta\chi^2 = 8.23$, $p < .01$, and $\Delta\chi^2 = 14.49$, $p < .001$ respectively). For social skills, this improvement was not significantly larger than the non-significant change from pretest 2 to posttest ($\Delta\chi^2 = 2.25$, $p > .05$). Children did not significantly improve on self-efficacy from pretest 1 to pretest 2, or from pretest 2 to posttest. There were no changes in any of the outcomes from posttest to follow-up (i.e., the follow-up period in the experimental conditions).

Differences Between the Experimental Conditions and the Control Condition

Cognitive Restructuring Condition Compared to the Control Condition

Children's significant improvement on self-worth, self-perceived competence, and automatic thoughts during the intervention period in the CR-condition were not significantly larger than the changes in the control condition during this period ($\Delta\chi^2 = .25$, $p > .05$, $\Delta\chi^2 = .00$, $p > .05$, and $\Delta\chi^2 = .17$, $p > .05$ respectively). Children's significant improvement on self-worth, self-perceived competence, automatic thoughts during the follow-up period in the CR-condition were significantly larger than the non-significant changes in the control condition during this period ($\Delta\chi^2 = 4.12$, $p < .05$, $\Delta\chi^2 = 4.49$, $p < .05$, and $\Delta\chi^2 = 8.26$, $p < .01$ respectively). There were no other differences between the CR-condition and the control group.

Psychophysical Condition Compared to the Control Condition

Children's significant improvement on self-worth during the follow-up period in the PSY-condition was not significantly larger than the non-significant change in the control condition ($\Delta\chi^2 = .28$, $p > .05$). There were no other differences between the PSY-condition and the control group during the intervention period or the follow-up period.

Differences Between the Cognitive Restructuring and Psychophysical Condition

There were no significant differences between the CR-condition and the PSY-condition concerning children's (non-)significant improvements on self-worth, self-perceived competence, self-efficacy, automatic thoughts, social skills, and assertiveness during the intervention period or the follow-up period.

Table 2. *Model Parameters for the Unconstrained Latent Change Models Controlling for Cohort, and Differences Within and Between Conditions.*

	Psychophysical condition				Cognitive restructuring condition				Control condition			
	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}
Outcome	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*
Self-worth	17.32*** (3.47)	1.32 (2.53)	2.46 (2.67)	6.35*$_b$ (3.56)	17.89*** (1.12)	.40 (1.32)	**2.74*** (1.10)	4.35**$_a$ (1.40)	18.76*** (1.78)	**-2.07*** (.95)	1.92 (1.24)	1.00$_a$ (.87)
Self-perceived competence	49.62*** (5.01)	5.07 (4.13)	**6.47** (4.31)	4.60$_b$ (4.43)	49.74*** (1.85)	**5.24**** (1.51)	3.32* (1.56)	5.89**$_a$ (2.12)	53.81*** (2.38)	2.41 (1.53)	**3.28*** (1.61)	.69$_a$ (1.19)
Self-efficacy	27.37*** (2.68)	2.59 (2.71)	-.83 (3.07)	2.54 (3.73)	24.91*** (1.11)	1.48 (1.22)	**2.07** (1.57)	3.73 (1.69)	25.80*** (1.08)	-.91 (.93)	.53 (1.02)	.21 (.88)
Automatic thoughts	48.41*** (7.59)	**-10.40** (6.62)	-7.38 (5.77)	2.22$_b$ (6.90)	53.48*** (3.28)	**-7.61**** (2.73)	-6.22* (2.67)	-8.27**$_a$ (3.13)	47.83*** (3.33)	-2.63 (2.16)	**-4.77*** (2.30)	2.57$_a$ (1.93)
Social skills	117.21*** (7.94)	2.48 (7.15)	-2.70 (7.44)	6.93 (11.37)	116.43*** (3.43)	**4.54** (2.84)	2.37 (2.93)	5.35 (3.21)	117.97*** (2.96)	**5.00*** (2.14)	-.84 (1.92)	-.89 (1.56)
Assertiveness	18.92*** (2.20)	-.25 (1.94)	-.92 (1.81)	2.76 (2.11)	18.87*** (.78)	**1.31** (.78)	1.15 (.75)	.78 (.63)	19.36*** (.72)	**1.81**** (.61)	.62 (.58)	-.65 (.61)

Note. Δ_{2-1} = pre-intervention period; Δ_{3-2} = intervention period; Δ_{4-3} = follow-up period. Latent means in bold differ significantly from the within-group (pre-)intervention period at $p < .05$. Latent means in the same row that share subscripts differ at $p < .05$. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Discussion

This study evaluated the separate effectiveness of a cognitive restructuring and a psychophysical component in enhancing children's overall self-esteem using a three-arm microtrial design with four repeated measures. We compared the effects of the components on outcomes reflecting overall self-esteem (i.e., self-worth, self-perceived competence, and self-efficacy) and outcomes that are related to self-esteem (i.e., automatic thoughts, social skills, and assertiveness). We also compared the effects of the components to a no-treatment control condition. Our expectation that both components would outperform the no-treatment control condition was only confirmed for the cognitive restructuring component. The effect of cognitive restructuring was not immediate, but rather a sleeper effect that became visible at follow-up. Contrary to our expectation, the psychophysical component did not outperform the no-treatment control condition, and the cognitive restructuring component did not outperform the psychophysical component.

Effects of Cognitive Restructuring and Psychophysical Components

Our findings do not provide convincing evidence that the cognitive restructuring or psychophysical component has immediate effects on children's overall self-esteem. None of the immediate effects observed were substantially larger than changes observed in the period before the intervention, except for the immediate effect of cognitive restructuring on children's self-worth, nor were these effects substantially larger than observed changes in the no-treatment control condition. The cognitive restructuring component did have significantly beneficial effects at follow-up. In the three months up to the follow-up measurement, children's self-worth, self-perceived competence, and automatic thoughts substantially improved, and these improvements were larger than the changes observed in the no-treatment control condition during this period. Thus, cognitive restructuring exercises appear to have delayed or "sleeper" effects on children's self-esteem. Perhaps, the sleeper effects reflect the time it takes for changes in thinking patterns to materialize into improved self-evaluations—which is different from targeting skills that can immediately be applied in real life. For example, a microtrial into effective components to reduce social anxiety in children showed that targeting social skills with exposure yielded immediate positive effects at posttest (de Mooij et al., submitted for publication; see Chapter 3).

Cognitive restructuring might be especially effective in improving children's self-worth and self-perceived competence because it teaches children to apply a planned approach to change negative thoughts and to focus on positive personal aspects. A more positive attitude may help children to evaluate themselves more favorably, which may in turn cause children to worry less about others' opinions and stimulate them to express their wishes and feelings more openly (i.e., show more assertive behavior; Jacobs & Cochran, 1982; Speed et al., 2018). Experiencing fewer unhelpful thoughts may enhance children's confidence in their ability to cope with challenging situations or feelings (Speed et al., 2018). Our findings support this idea; automatic thoughts improved immediately after

the intervention and continued to do so in the three months up to follow-up, whereas the positive effects on self-perceived competence only emerged in the follow-up period. This might imply that children need real-time experiences for competence to improve. Improvements in negative thoughts may lead to more assertive behavior, which leads to more peer acceptance (e.g., Lee, 2014) and this leads to improved self-perceived competence (Leary & Baumeister, 2000). An interesting avenue for future research might be to closely assesses the process of self-esteem enhancement using time series analyses.

The findings for the cognitive restructuring component are in line with previous research that demonstrated positive effects of cognitive restructuring therapies on self-esteem for children with anxiety, depression, and disruptive behavior problems (Taylor & Montgomery, 2007; Wanders et al., 2008). Importantly, our study suggests that cognitive restructuring does not require a clinical-level of psychopathology to improve aspects of children's self-esteem but has just as much relevance in a prevention setting.

In contrast to the significant effects of the cognitive restructuring component, our microtrial demonstrated that the psychophysical component did not have a significant effect on children's overall self-esteem, nor on any of the measured outcomes related to children's self-esteem. Perhaps this finding can be explained by the fact that the psychophysical component only indirectly addressed self-esteem through body movement and did not directly target the biased cognitions and negative emotion patterns associated with low self-esteem. Thus, an effective intervention approach may need to address the cognitive constituent of self-esteem and related emotions primarily, or also include these at the least. Indeed, previous research suggests that cognitions and their accompanied emotions, in particular, are important for how children in our age range (8 to 12 years) evaluate themselves overall (Leary & Baumeister, 2000). The absence of effects for the psychophysical component may also reflect a dosage-problem, however. While four one-hour sessions were enough for cognitive restructuring to sort effects and positive effects have been found for interventions of similar duration (e.g., Wanders et al., 2008), it might be insufficient for the psychophysical component.

Alternatively, the absence of effects found for the psychophysical component might indicate that overall, this intervention component does not work. Embodied cognition is an emerging field in psychotherapy (Leitan & Chaffey, 2014), and literature on child-focused interventions that use psychophysical exercises to improve social and emotional skills has not shown convincing evidence. Our findings are in line with a recent meta-analysis that concluded that psychophysical exercises do not seem to improve children's social and emotional skills (de Mooij et al., 2020). Not unimportant, there is limited support for the effectiveness of the Rock and Water program (Ykema, 2014)—which we distilled the current psychophysical intervention from. Only two randomized controlled studies into the effects of this intervention have been conducted. The first of these observed positive effects in adolescent males on (sexual) aggression (de Graaf et al., 2016). The second assessed the effects of the Rock and Water program as a preventive intervention for primary schools, and found positive, but negligible to small effects on self-regulation and self-esteem (Reitz et al., 2019). Psychophysical interventions may be popular due to

the attractiveness of the exercises, but these interventions may need to be strengthened by the inclusion of cognitive exercises.

A notable finding of this study was that we observed significant improvements on self-worth, self-perceived competence, automatic thoughts, social skills, and assertiveness between the two pretest measurements in all three conditions. These improvements in the weeks before the intervention may be explained by regression to the mean as we selected only those children for the intervention that reported low scores on the first pre-measurement (Barnett et al., 2005).

In this study, we asked children to reflect on how they generally think about themselves, which provided us with information about self-esteem *level*, whereas asking children to evaluate themselves multiple times a day would have provided us with information about self-esteem *stability* (Kernis, 2005). Future research might make use of a daily diary approach to take putative changes in self-esteem stability into account as well. Furthermore, including measures of children's bandwidth of the self (i.e., the breadth of experiences they base their self-evaluations on) might be useful in assessing children's stability in self-evaluations. Children's view of themselves may be more prone to moment-to-moment fluctuations when their self-evaluations are based mostly on the present moment (i.e., narrow bandwidth). Children that base their self-evaluations on experiences across a more extended period (i.e., broad bandwidth) may show more stable self-esteem level (e.g., Bukowski & Raufelder, 2018).

Despite the delayed intervention effects of the cognitive restructuring component, the difference in effects of the psychophysical component and the cognitive restructuring component on children's self-esteem did not reach significance. Perhaps, it takes time for the differences between the two components to become apparent. Considering that we observed significant positive effects for the cognitive restructuring component at follow-up, but not for the psychophysical component, it seems logical to expect that these differential effects would augment over time in favor of the cognitive restructuring component.

Besides the cognitive restructuring component, other components might also be effective in enhancing children's self-esteem. Neither component improved children's self-efficacy or social skills. A problem-solving component may improve children's ability to solve interpersonal problems and this may enhance the perception of their ability to deal with challenges (i.e., self-efficacy). In turn, this may improve their view of the self (e.g., Dumont & Provost, 1999). Hence, teaching children problem-solving strategies could be essential to improve self-efficacy and social skills, and, by extension, self-esteem.

Self-compassion may also be an effective component to enhance children's self-esteem. Teaching children to be kind and understanding towards themselves (i.e., self-compassionate) may even be more beneficial than teaching them to change their self-evaluations (Neff, 2011). Individuals might inflate their self-evaluations or devalue others to feel good about themselves and maintain positive self-esteem, and overvaluing the self may increase narcissistic tendencies (Brummelman et al., 2016). Self-compassion, on the

other hand, does not require social comparison, and may, therefore, be more effective in enhancing feelings of worthiness (see Neff, 2011). To illustrate, teaching self-compassion has shown to improve adolescents' emotional well-being (e.g., Bluth & Eisenlohr-Moul, 2017), and seems to be inversely correlated to psychological distress in 10 to 19-year-olds (Marsh et al., 2018).

Limitations and Strengths

A limitation of our study is that we did not power our study for moderator analyses, which did not allow us to assess *what works for whom.* Specifically, there may be individual variability in component effects. For instance, more cognitively developed children may benefit more from the cognitive restructuring component than children with less developed perspective-taking skills or fewer higher-order appraisals. Similarly, children with more developed cognitions may be able to translate the effects of psychophysical exercises into self-esteem more easily. Components may also have differential effects because self-esteem is derived from various sources such as academics or sports, which may differ from child to child; self-evaluations are domain specific and self-esteem in particular situations depends on the performance domain that is compared (Tesser et al., 2000).

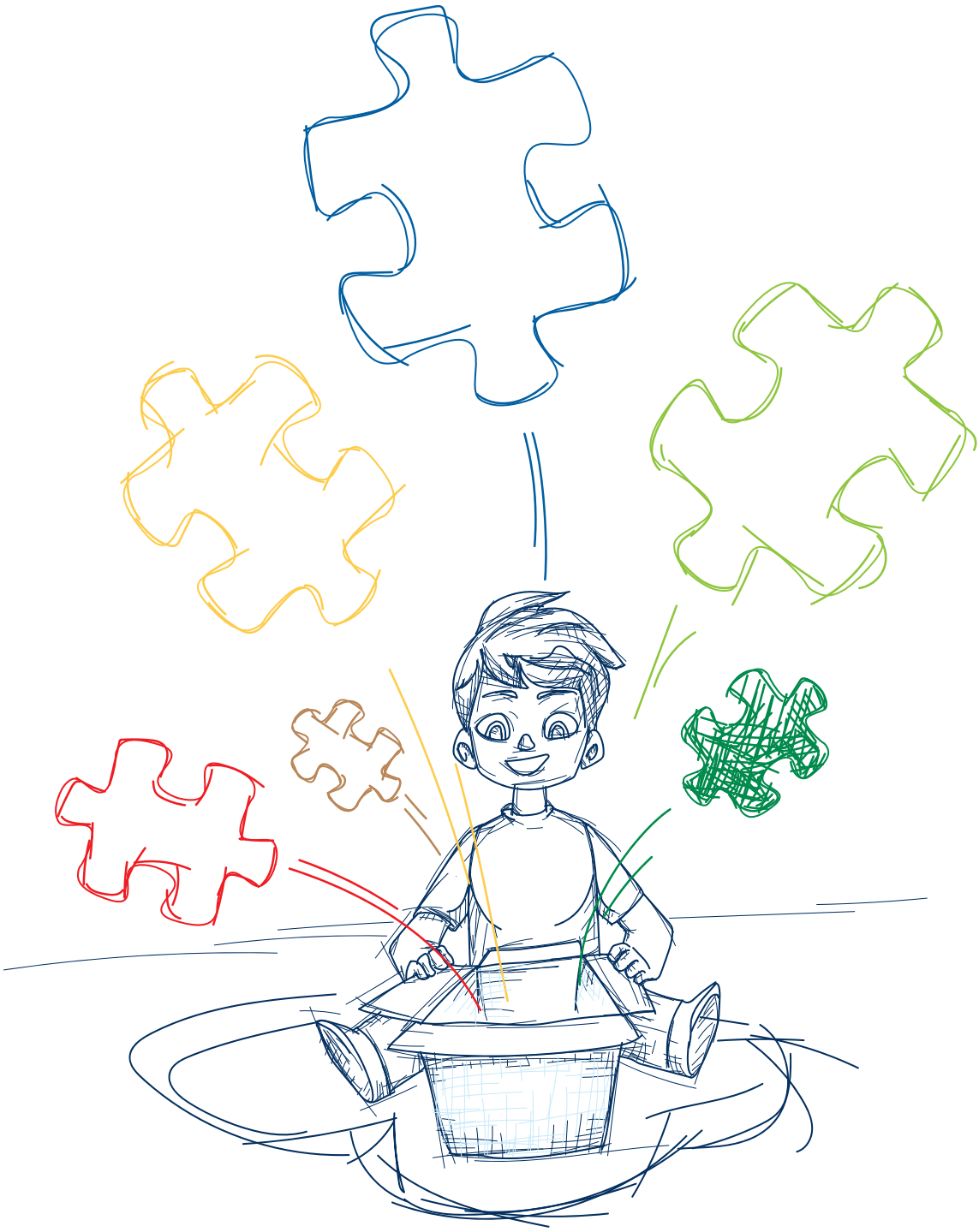
Component effects may also depend on a child's personality. Behavioral patterns can influence how individuals perceive themselves, and as such, self-esteem and personality seem closely linked (e.g., their development might overlap; Robins et al., 2001). Evidence was previously found for the moderating effect of personality in childhood interventions (e.g., Stolz et al., 2013). In addition, low self-esteem is often evaluated as an expression of various psychopathological outcomes, but it may also be an antecedent of such outcomes (Orth & Robins, 2014; Shirk et al., 2006). A better understanding of the mechanisms related to the development of low self-esteem and the causal relations between self-esteem and other psychopathology symptoms would be beneficial to our knowledge of self-esteem intervention effects (Borsboom & Cramer, 2013). Forthcoming studies should assess the process of self-esteem enhancement more closely, and take the influence of performance domains into account as well as differences in children's personality.

Notwithstanding these limitations, the strengths of the study were the randomized design and latent change modeling analytical approach. Also, including a separate control group and two pretest measurements allowed us to be stringent in distinguishing substantial intervention effects. Finally, including a follow-up measurement occasion enabled us to identify sustained and delayed ('sleeper') intervention effects we would have otherwise missed.

Conclusions

Our findings yield several conclusions with great practical relevance. First, they show that not all components in self-esteem interventions necessarily contribute to their effectiveness. Practitioners should be aware of the effectiveness of separate intervention

components and this should inform the choice for interventions and/or components accordingly. Our study suggests that psychophysical exercises do not enhance children's self-esteem, whereas cognitive restructuring exercises do—in the longer term. Thus, when there is little time for an extended, multi-component intervention it appears safe to implement a brief group intervention teaching children how to change unhelpful thoughts. Importantly, our study showed that it is possible to effectively improve self-esteem in eight-to-twelve-year-old children in a prevention context, provided that these interventions include cognitive restructuring. Providing children the tools to evaluate their own qualities and competencies more accurately may soften the sharp drop in self-esteem typically observed during adolescence and may prevent the development of unhealthy self-evaluations and related mental health problems.



CHAPTER 5

Does affirming children's autonomy and prosocial intentions help? A microtrial into intervention component effects to improve prosocial behavior.

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Abstract

Setting out from the belief that people innately desire to behave positively, this study assessed if affirming children's autonomy stimulates their prosocial behavior. We conducted a three-arm microtrial with four repeated measures to assess if a social-emotional skills intervention with an autonomy affirmation component had an additive effect on children's behavior compared to a "regular" intervention focused exclusively on teaching social-emotional skills and a no-treatment control condition. Our sample consisted of 779 children from grades four to six (M_{age} = 10.61, SD = .93). Findings from latent change modeling demonstrated that the social-emotional skills intervention with an autonomy affirmation component yielded superior effects compared to the "regular" intervention and the no-treatment control condition on the improvement of internalizing and externalizing problem behavior—but only in the long term. The intervention with autonomy affirmation did not yield superior effects on prosocial behavior and social skills, self-efficacy, and self-esteem or self-perceived competence. The absence of these effects may be attributed to the dosage of the interventions implemented—the affirmation of children's autonomy may require more than four sessions to sort observable effects. Overall, however, the findings of this study suggest that it may be beneficial to affirm children's autonomy and prosocial intentions when enhancing children's behavior.

Does affirming children's autonomy and prosocial intentions help? A microtrial into intervention component effects to improve prosocial behavior.

Many scholars and philosophers have discussed whether prosocial tendencies are innate. Some posed that people are innately evil and need rules to improve their behavior (e.g., Thomas Hobbes, 1651/1962). In contrast, others believed that people are innately good (e.g., Jean-Jacques Rousseau, 1773/1962). Children are capable of making moral choices from an early age (e.g., Hamlin, 2013), and a large cross-cultural study systematically found that people were intrinsically motivated to show prosocial behavior (Henrich et al., 2001). Motivation to show prosocial behavior seems to be a universal human pattern. Setting out from the belief that people are innately prosocial led us to raise the question of how to stimulate children's innate prosocial tendencies.

Prosocial Behavior: Causes and Consequences

Prosocial behavior is positive and voluntary behavior expressed *to the benefit of others*, such as helping others to get something they want, sharing toys, and comforting and caring for others when they are sad (Eisenberg et al., 2006; Eisenberg et al., 2016). Engaging in prosocial behavior requires several sociocognitive abilities, such as being able to hold a theory of mind, adequate processing of social information, and the ability to effectively regulate emotions (Dirks et al., 2018; Pakaslathi et al., 2002; Yagmurlu, 2014). Moral affect (e.g., feeling guilt or empathy) and moral cognition (e.g., moral reasoning and perspective-taking) also shape prosocial behavior (Liable et al., 2014). The interaction of these determinants produces behavior ranging from other-oriented and altruistic (e.g., comforting a sad friend) to more self-oriented and self-serving (e.g., helping to reduce negative arousal; Eisenberg et al., 2006; Paulus, 2014; Penner et al., 2005).

Prosocial behavior can be seen as a tool to maintain a desired level of social relatedness, social approval, and relationships. This is perhaps why adolescents gear up their prosocial behavior when their peers accept them but reduce their prosocial behavior when they feel excluded (Twenge et al. 2007; Wentzel & MacNamara, 1999). In any case, research has provided evidence that people are more likely to behave prosocially when they feel connected to others (Pavey et al., 2011), and prosocial behavior provides access to the pleasures derived from positive social interactions (Paulus, 2014). For instance, positive other-oriented acts are related to increased positive affect and meaningfulness of experiences (e.g., Martela & Ryan, 2016). Prosocial behavior predicts higher academic achievement in children (Caprara et al., 2000), and prosocial children have fewer hostile attributions and are less reactive to provocation than less prosocial children (Nelson & Crick, 1999). Prosocial behavior is also related to self-efficacy: children's belief in their ability to show empathy and regulate negative affect determines the display of prosocial behavior (Caprara et al., 2012).

Enhancing Children's Prosocial Behavior

Low levels of prosocial behavior have been related to peer rejection, anxiety, depression, and externalizing behavior in children (Nantel-Vivier et al., 2015; Flynn et al., 2015; Wentzel & McNamara, 1999). Given the detrimental effects of children's lack of prosocial behavior and the many known beneficial effects of prosocial behavior, many different social-emotional skills interventions have been designed and implemented (Catalano et al., 2002). These interventions help children acquire an adequate set of social-emotional skills that enable them to show appropriate behavior (including prosocial behavior). Most interventions apply a cognitive-behavioral approach (Bandura, 1978; Crick & Dodge, 1994) and aim to bring about behavior change by teaching children adaptive skills using methods such as modeling, role-play, and reinforcement techniques (e.g., tangible rewards and praise; Spence, 2003).

Merely teaching children *how* to show social-emotional skills may sort limited behavioral changes. According to self-determination theory (SDT), psychological growth and well-being require the fulfillment of three basic needs: competence, relatedness, and autonomy. SDT also poses that people generally have prosocial intentions (Ryan & Deci, 2000). Following the SDT model of change, people not only need to have a sense of being respected, understood and cared for (i.e., relatedness) and to learn the tools and skills for behavior change (i.e., competence), but also need to value and personally endorse the behavior (i.e., autonomy; Ryan et al., 2008). SDT also poses that behavioral changes stick better when people feel their needs are met (i.e., when they are highly self-determined) because they feel in control and responsible for their actions, and intrinsically motivated (Ryan & Deci, 2017, Ryan et al., 2008). In childhood, this means that children need to learn social-emotional skills, feel connected to their classmates, teachers, or trainers, and feel that their behavior and goals are self-advocated.

Skills associated with self-determinance—the ability to make choices and decisions, solve problems, set goals, regulate behavior, be assertive, and feel like being in control (i.e., self-efficacy; e.g., Algozzine et al., 2001; Carter et al., 2011)—are not uniquely related to self-determination, but rather overlap with "regular" skills taught in childhood social-emotional skills interventions. For example, these interventions include strategies to strengthen social, emotional, behavioral, cognitive, and moral competencies (Catalano et al., 2002). To illustrate, Carter et al. (2011) established that a sizeable number of school-based interventions for children with or at risk for emotional and behavioral disorders included components aimed at skills associated with self-determination (95% of the reviewed studies). Only a few, however, included a component aimed at self-advocacy (8.6% of the reviewed studies). Intrinsic motivation to behave positively is thought to flourish when all three SDT needs are met, thus it may be essential to affirm children's autonomy and innate positive intentions to improve (prosocial) behavior (Ryan & Deci, 2017; Weinstein & Ryan, 2010).

Do Social-Emotional Skills Interventions Improve Prosocial Behavior?

A systematic review of reviews and meta-analyses concluded that universal, school-based social-emotional skills programs have small to moderate positive effects on children's prosocial behavior (Weare & Nind, 2011). Other meta-analyses have also shown that these interventions improve children's social-emotional skills and behavior both in short-term and long-term (Cohen's *d* ranging from .23 to .70, Durlak et al., 2011; de Mooij et al., 2020; Sklad et al., 2012; Taylor et al., 2017). Social-emotional skills interventions increased children's positive attitudes towards themself and others (such as prosocial beliefs, Cohen's *d* = .23), positive social behavior (such as getting along with others, Cohen's *d* = .24; Durlak et al., 2011), and prosocial behavior (Cohen's *d* = .39, Sklad et al., 2012). Interventions specifically targeting prosocial interactions yielded a moderate effect on children's interpersonal skills (Cohen's *d* = .66; de Mooij et al., 2020).

Evidence for effects of childhood social-emotional skills intervention with a focus on SDT, and the additive effect of affirming children's autonomy, specifically, is scarce. Even so, previous research backs the notion that enhancing autonomy in interventions may be beneficial. Cross-sectional research in adults showed that being autonomously self-regulated was related to prosocial engagement (Gagné, 2003). Autonomy-supportive care climates predict higher levels of autonomy, competence, and relatedness. Meta-analyses also showed that promoting autonomy predicts improved physical and mental health in adolescents and adults (Ng et al., 2012; Teixeira et al., 2012). From the perspective of teaching styles, meta-analyses showed that teachers' autonomy-supportive approach was associated with improved engagement in physical education (Lochbaum & Jean-Noel, 2016; Raabe et al., 2019).

These previous studies tell us that encouraging children's self-determination through autonomy support may be an important additive component to enhance children's social-emotional skills in general, and prosocial behavior specifically. However, at this moment, the evidence is scarce for the effectiveness of autonomy affirmation as an intervention component in a school-based social-emotional learning context. To our knowledge, Topper Training is the only childhood intervention that explicitly affirms children's autonomy and prosocial intentions. Studies found positive effects of this intervention on children's prosocial behavior, self-esteem, depressed mood, victimization, and classroom climate (Vliek, et al., 2014; Vliek, 2019; Vliek et al., 2019). These findings suggest that an intervention that teaches social-emotional skills and affirms children's autonomy improves social-emotional outcomes, but based on these findings, we cannot conclude if the observed improvements were driven by the autonomy affirmation component of the intervention specifically.

In general, social skills interventions include multiple components and strategies to attain similar goals, and these programs are mostly evaluated as complete packages. Programs that target children's social and emotional skills are heterogeneous, and the effectiveness of interventions varies considerably (Weare & Nind, 2011), calling for research into what drives intervention effects. Furthermore, if autonomy affirmation proves to be an essential component to enhance children's behavior, existing social-emotional skills interventions may become more effective with minor adjustments.

Present Study

In this study, we assessed if affirming children's autonomy and intrinsic prosocial intentions is an essential component of universal social-emotional skills interventions to enhance children's prosocial behavior. We used a three-arm microtrial approach, which is a brief randomized experimental approach to assess the impact of separate intervention components (Howe et al., 2010). The information derived from microtrial studies like this one can inform intervention theory and help advance practice (Leijten et al., 2015).

We addressed two research questions in this study: (i) Are brief classroom-based social-emotional skills interventions effective in improving children's prosocial behavior?; and (ii) Is a brief classroom-based social skills-emotional intervention with an autonomy affirmation component more effective in enhancing children's prosocial behavior compared to a brief classroom-based social-emotional skills intervention without this component?

Our first hypothesis was that the interventions with and without an autonomy affirmation component are both effective in improving children's prosocial behavior, social skills, self-esteem, self-efficacy, self-perceived social competence, positive classroom climate, internalizing behavior, and problem behavior. We thus expected both interventions to outperform the no-treatment control group. Our second hypothesis was that an autonomy affirmation component has an additive intervention effect. We thus expected the intervention with the autonomy affirmation component to outperform the intervention without this component on all outcomes.

We focussed on eight-to-twelve-year-old children as interventions aimed at children's prosocial behavior mostly target this age-group (Mesurado et al., 2019; Weare & Nind, 2011). Self-determination also seems to be a developmental task, and promoting this from an early age may be beneficial to children (Dirks et al., 2018; Eisenman & Chamberlin, 2001).

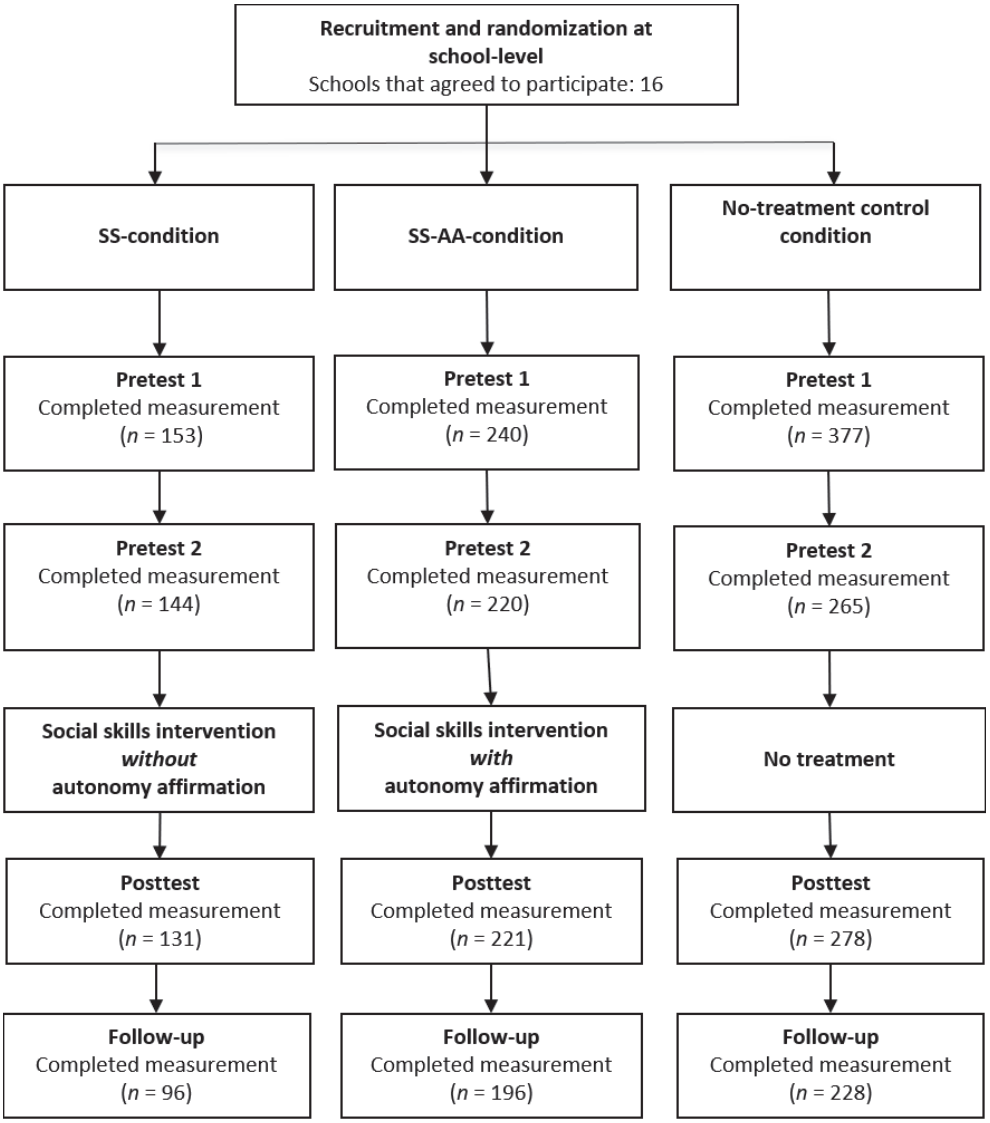
Method

Participants

The participants had a mean age of 10.61 years (*SD* = .93, range 8.14 to 13.67 years) at pretest 1. Our sample consisted of 779 participants: *n* = 157 children participated in the social skills intervention without the autonomy affirmation component (SS-condition), *n* = 243 children participated in the social skills intervention with the autonomy affirmation component (SS-AA-condition) and *n* = 379 children in the no-treatment control condition. Approximately half of the sample was male (53%, *n* = 410). Children were defined as Western if they originated from European countries (not including Turkey), Northern America, Oceania, Indonesia, or Japan. Children were defined as Non-Western if they originated from Africa, Latin America, Asia (not including Indonesia and Japan), or Turkey (Dutch Bureau for Statistics, n.d.). Following this definition, 66.2% (*n* = 516) of the

sample had a Western origin. Six children did not disclose their ethnicity. Not all children completed all measurement occasions (see Figure 1), but those that did, did not differ significantly from those that missed one or more measurement occasion on any of the outcome variables at pretest 1.

Figure 1. *Participant Flowchart.*



Design

We used a randomized microtrial approach with three conditions (i.e., SS-condition, SS-AA-condition, and a no-treatment control condition) and four time-points. Randomization took place at the school level before the first measurement occasion. The measurement occasions took place approximately five weeks before the start of the intervention (i.e., pretest 1), one week before the start of the intervention (i.e., pretest 2), one week after the intervention had ended (i.e., posttest), and approximately three months after the intervention had ended (i.e., follow-up). An a priori power analysis established that 100 participants were necessary per condition to identify a moderate effect of .40, with a power of .80 and an alpha of 0.05 (two-sided). The Ethics Review Board of the University of Amsterdam approved this study (2017-CDE-8098).

Sampling Procedures

We invited schools to participate in our study if they provided regular primary education and had a sufficient number of pupils (i.e., at least 50 children in the top three grades). We excluded schools that had previously implemented Topper Training because we based our intervention with the autonomy affirmation component on this universal intervention (see paragraph "Brief Interventions"). Schools were randomized into one of the three conditions upon registration to the study using a random number generator.

We recruited twelve schools between May 2017 and August 2017. Four schools completed the first measurement occasion in September 2017, and eight schools completed the first measurement occasion in January 2018. Another four schools were recruited through an advertisement in a Dutch national magazine for school counselors between May 2018 and August 2018 to achieve the required number of participants in the two experimental conditions. These schools completed the first measurement occasion in September 2018. One school in the control group only completed pretest 2 and was therefore excluded from the final sample, which consisted of 16 schools: four in the SS-condition, five in the SS-AA-condition, and six in the no-treatment control condition. All classes in the top three grades of these schools participated in the study. Some had a large number of pupils and multiple classes per grade, which caused an uneven distribution of the number of classes per condition. The SS-condition contained a total of nine classes, the SS-AA-condition contained 14 classes, and the control condition contained 24 classes. Compensation for schools in the experimental conditions was 50 euro, and 150 euro for schools in the control group.

Procedure

We informed parents about the study and requested active consent before pretest 1. We visited all participating schools to supervise data collection at pretest 1. Before the distribution of the questionnaires, we informed children that the study aimed to improve current childhood interventions, and our goal was to gather information about children's opinions and day-to-day feelings at school. Children without consent to complete the

measurement occasions remained in the classroom and worked on individual tasks. The completion of the instrument battery took approximately 60 minutes at each time-point. After pretest 1, school personnel supervised the remaining three measurement occasions.

Outcome Measures

Prosocial Behavior. Children's prosocial behavior was measured using the Prosocial behavior subscale from the Topper Questionnaire (shown to have adequate construct and convergent validity and reliability; Vliek, 2015). This self-report subscale measures to what extent children behave in a prosocial manner, feel competent in doing so and desire to behave in a prosocial manner. An example item is "I help children in my class.". Children answered the nine-item subscale on a four-point scale (1 = *not true at all* to 4 = *very true*). The sum score of the items could range from 9 to 36; reliability was good across measurement occasions (α = .94 to .99).

Social Skills. Children's social skills were measured using the Dutch translation (van den Heuvel et al., 2017) of the self-report version of the Social Skills Improvement System-Rating Scales (SSIS-RS; Gresham & Elliott, 2008). The English version of the SISS-RS has shown strong psychometric properties (Gresham et al., 2011). This measure includes multiple scales measuring aspects of social skills, and children answered items on a four-point scale (*1 = not true at all* to *4 = very true*). The sum of the subscales Assertion (e.g., "I ask for information when I need it.", 7 items), Cooperation (e.g., "I pay attention when others present their ideas.", 7 items), Communication (e.g., "I say 'please' when I ask for things.", 6 items), Responsibility (e.g., "I have good manners.", 7 items), Empathy (e.g., "I try to forgive others when they apologize.", 6 items), Engagement (e.g., "I get along with other children.", 7 items), and Self-control (e.g., "I stay calm when I am being teased.", 6 items) comprised the Social skills outcome measure. Sum scores could range from 46 to 184; reliability was good across measurement occasions (α = .97 to .99).

Self-Esteem. We assessed global self-esteem using the Dutch version of the Rosenberg Self-Esteem Scale (RSES; Franck et al., 2008), which is a well-known scale to assess self-evaluations. This scale consists of five positively worded items (e.g., "I am happy with myself.") and five negatively worded (e.g., "I feel worthless sometimes.") items that children answered on a four-point scale (*1 = not at all true* to *4 = very true*). The items were transformed for a higher score to reflect higher self-esteem. The sum score could range from 10 to 40; reliability was satisfactory across measurement occasions (α = .65 to .75).

Self-Efficacy. We used the Dutch adaptation of the General Self-Efficacy Scale (GSES; Teeuw et al., 1994) to measure children's general self-efficacy. This scale measures how children cope with difficult situations and whether they believe they can successfully deal with challenging situations. This measure consists of 10 items (e.g., "I can solve most problems if I try hard enough.") that children answer on a four-point scale (*1 = not at all true* to *4 = very true*). A higher score reflects greater general self-efficacy. The sum scores could range from 10 to 40; reliability of the GSES was good across measurement occasions (α = .94 to .99).

Self-Perceived Competence. Children's self-perceived social competence was measured using the Dutch translation (Veerman et al., 1997) of the Self-perception Profile for Children (SPPC; Harter, 1985). We included subscales Social acceptance, Behavioral conduct, and Global self-worth (18 items in total). In the original scale, all items consisted of two conflicting statements, and children indicate how accurate the best fitting statement is for them. To simplify the items and make them more consistent with the other outcome measures, we reformulated the items and answering categories (*1 = not true at all* to *4 = very true*). An example item is "I have a hard time making friends.". The sum score could range from 18 to 72; reliability of the SPPC was good across measurement occasions (α = .83 to .86).

Classroom Climate. We used the Classroom Peer Context Questionnaire (CPCQ) to assess how children viewed the climate in their classroom. The CPCQ has good validity and reliability (Boor-Klip et al., 2016). This scale includes five subscales: Comfort (e.g., "I like my class.", 4 items), Cooperation (e.g., "In this class, children collaborate well.", 4 items), Conflict (e.g., "In this class, children gossip about each other.", 4 items), Cohesion (e.g., "In this class, everyone gets along well.", 4 items) and Isolation (e.g., "In this class, some children are outsiders.", 4 items). All items were rated by children on a five-point scale (*1 = not true at all*, *5 = very true*). The sum score could range from 20 to 100; reliability of the CPCQ was good across measurement occasions (α = .90 to .98).

Internalizing Behavior. Children's internalizing behavior was assessed using the subscale Internalizing behavior (e.g., "I am afraid of many things.", 10 items) from the SSIS-RS (Gresham & Elliott, 2008). Children answered all items on a four-point scale (*1 = not true at all* to *4 = very true*). The sum score could range from 10 to 40; reliability was good across measurement occasions (α = .90 to .99).

Externalizing Behavior. To assess children's problem behavior we used the subscales Externalizing behavior (e.g., "I hurt others when I am angry."), and Bullying (e.g., "I don't allow others to join my group of friends.") from the SISS-RS (Gresham & Elliott, 2008). Children answered the 15 items on a four-point scale (*1 = not true at all* to *4 = very true*). The sum score could range from 15 to 60; reliability was good across measurement occasions (α = .93 to .99).

Brief Classroom Interventions

We developed two brief classroom interventions to examine the additive effect of affirming children's autonomy in social-emotional skills interventions. We distilled and adapted exercises from existing, known effective programs, such as the ABC Competency Training (het ABC Onderwijsadviseurs, 2015), and Zippy's Friends (Partnership for Children, 2007) to form the intervention without the autonomy affirmation component. To form the intervention with the autonomy affirmation component, we also used the core exercises and autonomy-supportive language of Topper Training (Topper Training Foundation, 2007-2020). The final interventions were extensively reviewed by experienced trainers to guarantee appropriateness for the target audience and employability. Both interventions

(i) consisted of four one-hour sessions provided to grades four, five and six separately, (ii) were implemented weekly, during school hours, in four consecutive weeks, (iii) included information letters for parents and teachers about each session, (iv) used language to stimulate children's experience of relatedness to each other and the trainer, and (v) used complementary materials, such as hand-outs and posters. Teachers were present during sessions but did not actively partake in the child-focused interventions. Appendix A, Table A.1. presents a summary of the interventions.

Trainers had an average of 4.5 years of professional experience. Two trainers provided the intervention in the SS-condition, and five trainers specially trained to address children's autonomy provided the intervention in the SS-AA-condition.

Social Skills Intervention Without an Autonomy Affirmation Component

The social skills intervention without the autonomy affirmation component included exercises teaching children basic social-emotional skills that are typically included in established social-emotional skills interventions. The exercises instructed children on how to behave in a prosocial manner and model this behavior. Several behaviors that are important for positive social interactions were addressed, including communication skills, problem-solving skills, and emotional skills. For example, children were taught to look others in the eye and practiced basic communication techniques such as starting and maintaining a conversation and communicating boundaries.

Social Skills Intervention With an Autonomy Affirmation Component

The social skills intervention with the autonomy affirmation component addressed the same social-emotional skills as the intervention without autonomy affirmation, with one core difference: all exercises were geared towards affirming children's autonomy and prosocial intentions (i.e., the autonomy affirmation component). This intervention builds on the notion that most people have the authentic desire to be trusted and act in ways that increase the well-being of the self and others, and that people have agency over how they behave. Autonomy and prosocial intentions were stimulated at the instructional level (i.e., the trainers used autonomy-supportive language to increase awareness of the motivation and choice for prosocial behavior), as well as through the actual exercises. All exercises affirmed children's prosocial intentions and the responsibility to make choices that are in line with this intention (Vliek, 2015; Vliek et al., 2019).

Children reflected on their authentic selves (i.e., their personally valued interests) and practiced behaving authentically and respectfully towards themselves and others. A key exercise teaches children they can choose how they want to behave, and reflect on their responsibility and prosocial intentions using different colored caps that represent different types of behavior. The white cap stands for authentic and reliable behavior. A child that "wears" this cap chooses to show authentic, reliable behavior, which is the desire of most children. Trainers model and children role-play different types of behavior using these caps to make children aware of their own and others' (choice in) behavior. Children are also made aware of the consequences of their behavior using a feedback exercise. See Appendix A. and Vliek (2015) for a detailed explanation of the exercises.

Statistical Analyses

We analyzed the data using latent change models (LCMs) in M*plus* version 7.31 (Muthén & Muthén, 1998-2015). All analyses were intention-to-treat, and the models were fit using full information maximum likelihood to make use of all the available data (e.g., Raykov, 2005). We accounted for non-independence of observations due to the nesting of participants within classes by correcting the standard errors of the estimates for the non-independence of the data (i.e., type complex command; Muthén et al., 2002).
We assessed the changes in the three conditions using a multigroup approach, and we based our model on the model described by Schmidt et al. (2014). First, we ran unconstrained LCMs to assess the changes between measurement occasions. The reference point (i.e., intercept) in our models was pretest 2, which allowed us to assess the changes in children's self-reported behavior from pretest 1 to pretest 2 (hereafter the pre-intervention period), and from pretest 2 to posttest (hereafter the intervention period). We used an equivalent model with posttest as the reference point to assess the change from posttest to follow-up (hereafter the follow-up period). Appendix B, Figure B.1 presents an illustration of our model. We assessed model fit using chi-square statistics, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI; Hu & Bentler, 1999).

Change parameters were constrained to equality within conditions (e.g., pre-intervention period change and intervention period change in the SS-condition) and across conditions (e.g., intervention period change in the SS-condition and the control condition) to assess both within- and between-condition differences. We compared the fit of constrained models to the fit of unconstrained models using chi-square difference tests. A significant chi-square difference means that the constrained parameters were significantly different. The syntax for the (un)constrained models is available in Appendix B.

Results

Preliminary Analyses

Before running the latent change models, we examined if randomization had been successful using ANOVAs and chi-square tests. Results showed that the conditions did not differ concerning gender or baseline levels of prosocial behavior, social skills, externalizing behavior, and classroom climate. We did find differences between conditions at pretest 1 in terms of age, F (2,776) = 10.45, $p < .001$. Specifically, we found that children in the control group (M = 10.75, SD = .86) were slightly older than children in the SS-condition (M = 10.47, SD = .86) and the SS-AS-condition (M = 10.44, SD = 1.03). The SS-condition also contained more children of non-Western origin compared to the control condition, χ^2 (1, N = 779) = 131.65, $p < .001$. Linear regression analyses showed that age and ethnicity did not explain significant variance (regression statistics available on request), so we did not control for age or ethnicity in the subsequent models. There were also significant differences between the conditions concerning pretest 1 scores on self-esteem, F (2,736) = 4.18, p = .02, self-efficacy, F (2,735) = 7.01, $p < .001$, self-perceived

social competence, F (2,736) = 7.98, $p < .001$, and internalizing behavior, F (2,749) = 3.77, $p = .02$. The LCMs included pretest 1 to control for initial differences. Table 1 presents the means and standard deviations of all outcomes at all measurement occasions.

Bivariate correlations (see Appendix C, Tables C.1, and C.2) indicated significant, moderate to strong associations in the expected direction between all outcome variables except internalizing behavior, externalizing behavior, and class climate. Only the correlation between externalizing behavior and classroom climate at pretest 2 was significant. The other correlations between these variables were not.

Effects of the Interventions With and Without Autonomy Affirmation

We assessed the effects of the interventions using multigroup latent change models (LCMs). The fit indices were adequate for all outcome measures: chi-squares were non-significant, RMSEA-values were lower than .08, and CFI-values were higher than .95 (Hu & Bentler, 1999; see Appendix D, Table D.1 for the full fit statistics). Table 2 presents parameter estimates for the LCMs. Parameters in bold font indicate a significant difference between the change during the pre-intervention period and the change during the intervention period within a condition; the parameter in bold signaling the larger change. Subscripts indicate a difference between conditions. Appendix D, Tables D.2. and D.3. present the complete fit indices for the constrained LCMs and the chi-square difference values used to assess the within-condition and between-condition differences.

Effects of the Intervention With Autonomy Affirmation

In the SS-AA-condition, children's social skills, self-esteem, self-efficacy, and self-perceived competence significantly increased during the intervention period. For self-efficacy, this change was significantly larger than the change during the pre-intervention period ($\Delta\chi^2 = 11.33$, $p < .001$). Children's social skills, self-esteem, and self-perceived competence also significantly increased during the pre-intervention period, and these changes were significantly larger than the changes during the intervention period on these variables ($\Delta\chi^2 = 22.69$, $p < .001$, $\Delta\chi^2 = 22.59$, $p < .001$, and $\Delta\chi^2 = 31.50$, $p < .001$, respectively). Children's class climate, internalizing behavior, and externalizing behavior did not significantly change during the intervention period. Children's prosocial behavior, internalizing behavior, and externalizing behavior also significantly changed during the pre-intervention period, and these were significantly larger than the changes in the intervention period ($\Delta\chi^2 = 20.70$, $p < .001$, $\Delta\chi^2 = 31.94$, $p < .001$, and $\Delta\chi^2 = 22.29$, $p < .001$, respectively). Only externalizing behavior significantly changed during the follow-up period. Children's externalizing behavior significantly decreased during this period, and this change was significantly larger than the change during the intervention period ($\Delta\chi^2 = 6.73$, $p < .01$).

Table 1. *Means and Standard Deviations of Outcome Measures at Four Measurement Occasions.*

	SS-condition				SS-AA-condition				Control condition			
	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up	Pretest 1	Pretest 2	Posttest	Follow up
Outcome	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Prosocial behavior	30.77 (3.35)	31.07 (3.47)	30.96 (4.44)	30.62 (5.24)	31.40 (3.28)	32.11 (3.23)	32.79 (3.26)	32.43 (3.18)	31.13 (3.26)	31.38 (3.44)	31.72 (3.67)	31.67 (3.75)
Social skills	141.16 (16.94)	142.69 (19.39)	144.82 (20.40)	143.74 (20.82)	144.42 (16.90)	148.94 (17.82)	150.92 (18.44)	151.42 (16.04)	143.65 (16.17)	146.34 (16.29)	147.36 (17.21)	147.68 (19.07)
Self-esteem	20.76 (4.51)	21.42 (4.40)	22.26 (4.43)	21.88 (4.84)	21.31 (4.45)	22.01 (5.08)	23.13 (4.20)	23.31 (3.95)	21.90 (3.87)	22.45 (4.10)	22.83 (4.35)	23.62 (3.65)
Self-efficacy	29.03 (5.53)	29.92 (5.14)	30.44 (5.66)	30.14 (6.33)	30.86 (4.96)	31.66 (5.15)	32.61 (5.02)	31.79 (5.33)	29.91 (4.43)	30.60 (4.57)	31.43 (4.92)	31.86 (5.03)
Self-perceived competence	58.76 (8.13)	60.59 (7.38)	61.04 (7.94)	60.08 (8.80)	60.86 (7.73)	62.47 (7.39)	63.54 (7.13)	63.41 (7.26)	61.57 (6.66)	61.97 (7.61)	62.71 (7.46)	63.49 (7.03)
Class climate	64.38 (6.28)	64.77 (5.81)	64.68 (8.06)	64.32 (8.69)	65.16 (5.30)	65.33 (6.22)	65.51 (6.24)	66.14 (5.46)	64.35 (5.67)	64.10 (5.52)	64.59 (6.40)	65.13 (6.06)
Internalizing behavior	17.97 (5.91)	16.90 (5.83)	16.19 (6.45)	17.38 (6.78)	17.44 (5.73)	16.03 (5.66)	15.01 (5.39)	14.50 (5.01)	16.60 (5.28)	15.38 (5.30)	14.86 (5.30)	15.32 (5.45)
Externalizing behavior	24.90 (6.50)	24.53 (7.39)	23.49 (7.27)	24.45 (7.40)	24.26 (6.41)	22.34 (5.61)	22.06 (6.60)	21.25 (5.58)	23.91 (5.82)	23.12 (6.07)	22.77 (6.49)	23.18 (7.24)

Note. SS-condition = social skills intervention; SS-AA-condition = social skills intervention with autonomy affirmation.

Table 2. *Model Parameters for the Unconstrained Latent Change Models.*

	SS-condition				SS-AA-condition				Control condition			
	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}	intercept	Δ_{2-1}	Δ_{3-2}	Δ_{4-3}
Outcome	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*
Prosocial behavior	30.76 (.26)	.22 (.22)	-.08$_{a}$ (.27)	-.24 (.45)	31.41 (.36)	**.63*** (.31)	.51$_{ab}$ (.26)	-.17 (.16)	31.12 (.24)	-.01 (.16)	**.51**$^{***}{}_{b}$ (.11)	-.15 (.17)
Social skills	141.12 (1.67)	.83 (.61)	2.52 (1.30)	-.16 (1.65)	144.50 (1.51)	**3.67**** (1.29)	1.80* (.86)	.73 (1.19)	143.47 (1.21)	**2.41**** (.86)	1.50* (.68)	-.89 (1.30)
Self-esteem	20.75 (.37)	.52 (.40)	**.68**** (.24)	.13 (.23)	21.31 (.35)	**.88***** (.25)	.75** (.23)	.36 .21	21.82 (.21)	**.55**** (.21)	.50 (.18)	.54* (.26)
Self-efficacy	28.93 (.51)	**.91*** (.22)	.46 (.38)	-.00 (.24)	30.89 (.45)	.58 (.37)	**.58*** (.27)	-.37 (.33)	29.87 (.24)	.68** (.19)	.78*** (.20)	.37 (.24)
Self-perceived competence	58.60 (.88)	**1.71***** (.32)	.42 (.38)	.25 (.54)	60.81 (.44)	**1.73**** (.61)	1.24** (.47)	-.39 (.31)	61.46 (.36)	.27 (.32)	.88** (.30)	.73 (.44)
Class climate	64.45 (.53)	.07 (.47)	.14 (.75)	-.44 (.91)	65.15 (.45)	.41 (.46)	-.08 (.38)	.67 (.45)	64.31 (.51)	-.12 (.29)	.37 (.37)	.27 (.36)
Internalizing behavior	18.09 (.49)	**-1.14**** (.34)	-.82 (.52)	.84$_{b}$ (.51)	17.49 (.47)	**-1.70***** (.31)	-.60 (.34)	-.57$_{a}$ (.31)	16.70 (.28)	**-1.27***** (.27)	-.38 (.25)	.58$_{b}$ (.40)
Externalizing behavior	25.06 (.77)	**-.54*** (.24)	-.76 (.59)	.90$_{b}$ (.52)	24.38 (.42)	**-1.77***** (.32)	.13 (.28)	-1.07$^{**}{}_{a}$ (.32)	24.03 (.44)	-.72** (.25)	-.35 (.19)	.48$_{b}$ (.45)

Note. Intercept = pretest 1; Δ_{2-1} = pre-intervention period; Δ_{3-2} = intervention period; Δ_{4-3} = follow-up period; SS-condition = social skills intervention; SS-AA-condition = social skills intervention with autonomy affirmation. Latent means in bold differ significantly from the within-group (pre-)intervention period at $p < .05$. Latent means that do not share subscripts differ at $p < .05$.

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Effects of the Intervention Without Autonomy Affirmation

In the SS-condition, children's self-esteem significantly increased during the intervention period, and this increase was significantly larger than the change during the pre-intervention period ($\Delta\chi^2 = 6.75$, $p < .01$). None of the other outcome measures significantly changed during the intervention period. The outcome measures did not significantly change during the follow-up period either. There were, however, some significant changes during the pre-intervention period. Children's self-efficacy, self-perceived competence, internalizing behavior, and externalizing behavior significantly changed during the pre-intervention period, and these changes were significantly larger than the changes during the intervention period ($\Delta\chi^2 = 7.01$, $p < .01$, $\Delta\chi^2 = 11.14$, $p < .001$, $\Delta\chi^2 = 8.52$, $p < .01$, and $\Delta\chi^2 = 5.89$, $p < .05$, respectively).

Changes in the Control Condition

In the control condition, children's prosocial behavior and self-perceived competence significantly increased from pretest 2 to posttest (i.e., the intervention period for the experimental conditions), and these changes were significantly larger than the changes from pretest 1 to pretest 2 (i.e., the pre-intervention period for the experimental conditions; $\Delta\chi^2 = 6.51$, $p < .01$, and $\Delta\chi^2 = 7.22$, $p < .01$, respectively) and from posttest to follow-up (i.e., the follow-up period for the experimental conditions; $\Delta\chi^2 = 3.94$, $p < .05$, and $\Delta\chi^2 = 9.39$, $p < .01$, respectively). Children's social skills and self-efficacy significantly increased from pretest 1 to pretest 2, and from pretest 2 to posttest. For social skills, the change from pretest 1 to pretest 2 was significantly larger than from pretest 2 to posttest ($\Delta\chi^2 = 29.18$, $p < .001$). The increase in self-efficacy was significantly larger from pretest 2 to posttest ($\Delta\chi^2 = 30.68$, $p < .001$). Children's self-esteem significantly increased from pretest 1 to pretest 2 and from posttest to follow-up, and both of these changes were significantly larger than the change from pretest 2 to posttest ($\Delta\chi^2 = 12.28$, $p < .001$, and $\Delta\chi^2 = 11.94$, $p < .001$, respectively). From pretest 1 to pretest 2, children's internalizing behavior and externalizing behavior significantly decreased. For internalizing behavior, this change was significantly larger than the change from pretest 2 to posttest ($\Delta\chi^2 = 18.45$, $p < .001$). For externalizing behavior, this was not the case ($\Delta\chi^2 = 1.47$, $p > .05$). There were no other significant within-group differences between time-points for any of the other outcome measures.

Differences Between the Conditions

There were no significant differences between the conditions concerning the changes on prosocial behavior, social skills, self-esteem, self-efficacy, self-perceived competence, and class climate during the intervention period. Children in the control condition increased significantly on prosocial behavior during the intervention period, and this change was significantly larger compared to the SS-condition ($\Delta\chi^2 = 3.66$, $p < .05$), but not compared to the SS-AA-condition ($\Delta\chi^2 = .30$, $p > .05$).

During the follow-up period, children in the SS-AA-condition decreased (non-)significantly on internalizing and externalizing behavior, and these changes were significantly larger compared to both the SS-condition ($\Delta\chi^2 = 4.36$, $p < .01$, and $\Delta\chi^2 = 13.16$, $p < .001$, respectively) and the control condition ($\Delta\chi^2 = 7.18$, $p < .01$, and $\Delta\chi^2 = 12.38$, $p < .001$, respectively). In the

SS-condition and the control condition, children's internalizing behavior and externalizing behavior increased during the follow-up period (see Figures 2 and 3). There were no other significant differences between the conditions during the follow-up period.

Figure 2. *Changes in internalizing behavior across conditions (square marker = SS-AA-condition; triangular marker = SS-condition; round marker = control condition).*

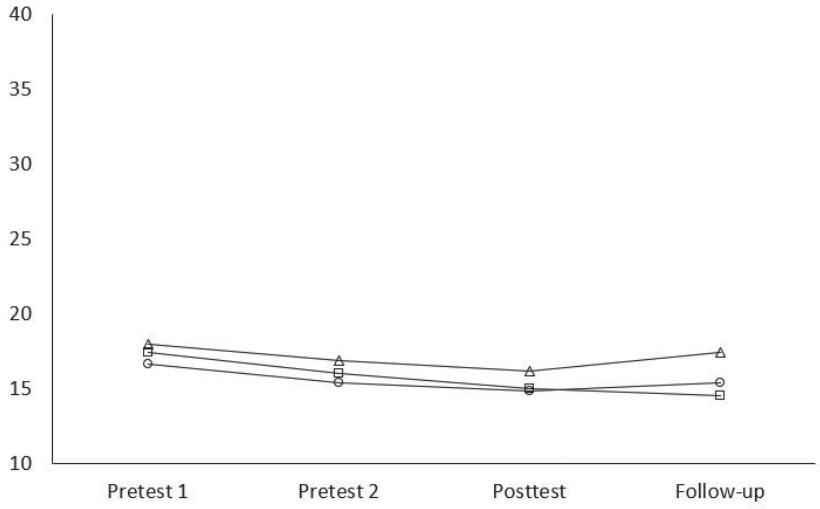
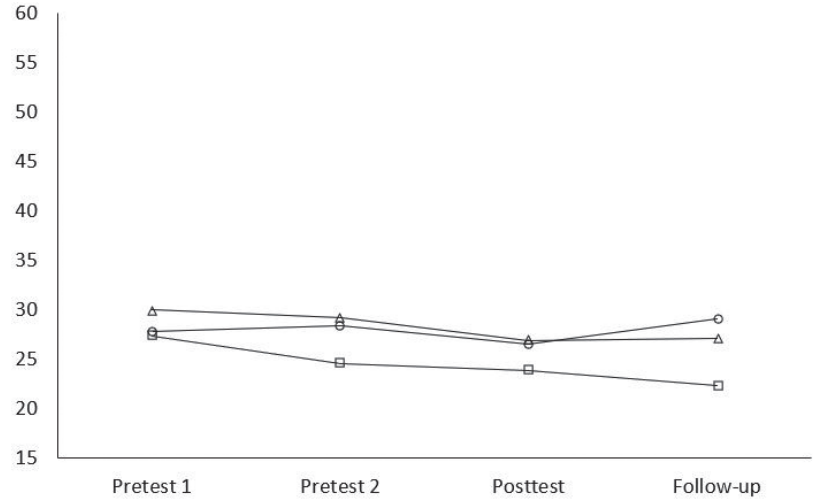


Figure 3. *Changes in externalizing behavior across conditions (square marker = SS-AA-condition; triangular marker = SS-condition; round marker = control condition).*



Additional Analyses

To assess if the intervention with autonomy affirmation was differentially effective for children reporting above-average externalizing behavior, we ran all latent change models for a subgroup of children from the SS-AA-condition that scored one standard deviation or more above the sample mean on externalizing behavior at pretest 1. We compared the effects of the intervention with autonomy affirmation in 206 children scoring below +1*SD* on externalizing behavior (hereafter the low-group) to a group of 37 children scoring +1*SD* or above on externalizing behavior (hereafter the high-group). We did not assess LCMs for prosocial behavior, social skills, and class climate due to poor fit to the data. The LCMs for the remaining outcomes had good model fit (non-significant chi-squares, RMSEA below .08, and CFI above . 95; see Appendix E, Table E.1).

In the high-group, children's self-esteem increased significantly during the follow-up period (μ = 2.64, *SE* = .86, $p < .01$), which was significantly larger than the change in the low-group during this period (μ = .04, *SE* = .22, $p > .05$; $\Delta\chi^2 = 10.12$, $p < .001$). In the high-group, children's externalizing behavior also significantly decreased during the follow-up period (μ = -4.48, *SE* = .70, $p < .001$), which was significantly larger than the change in the low-group during this period (μ = -.43, *SE* = .31, $p > .05$; $\Delta\chi^2 = 18.73$, $p < .001$). Appendix E, Tables E.2 to E.4 present the complete results for the additional analyses.

Discussion

This study assessed the additive effect of an autonomy affirmation component in a social skills intervention. We used a three-arm microtrial design with four repeated measures, comparing the effects of a social-emotional skills intervention that explicitly addressed children's autonomy to a brief classroom-based social-emotional skills intervention that did not, as well as to a no-treatment control condition.

Does Affirming Children's Autonomy Have an Additive Effect?

Our findings indicated that the autonomy affirmation component might have an additive beneficial effect in the long-term: the intervention with autonomy affirmation had superior effects—showing that in the three months after the intervention, children's externalizing behavior decreased significantly. This behavior change was substantially larger than the observed changes in the intervention without autonomy affirmation and the no-treatment control condition during this period. Similarly, children showed a continued decrease of internalizing behavior in the three months after the intervention with autonomy affirmation, whereas in the intervention without autonomy affirmation and the no-treatment control condition, children's internalizing behavior increased again.

These findings demonstrate that affirming children's autonomy appears to have a positive, accumulating effect on children's internalizing and externalizing behavior. In other words, helping children identify their inner goals and prosocial motivation using

social-emotional skills exercises, guided by autonomy-supportive language (e.g., "Was it your intention to upset that child?") seems to have a beneficial effect on children's thinking patterns and behavior. However, it takes time for these changes to become evident. This finding is in line with previous research on the Topper Training program—the intervention that we built our intervention with autonomy affirmation on—showing that the complete intervention (consisting of ten 90-minute sessions) had a delayed positive effect on children's symptoms of depression, but had an immediate and longlasting positive effect on children's internalizing behavior and externalizing behavior in a sample of children with mild to severe psychological problems (Vliek et al., 2019).

Research has shown that adolescents with more controlling parents experience more autonomy need frustration and that this is related to more behavioral problems (e.g., van Petegem et al., 2015). Perhaps, this association also holds in the opposite direction in the relationship between children and teachers or trainers. Thus, the mechanism of change underlying the effects of the intervention with autonomy affirmation may be as follows: the autonomy-supportive language used in the intervention shows children that the adults in their lives provide space for them to behave autonomously, and children's awareness of this responsivity diminishes the frustration of their need for autonomy. As a result, this might lead to a decrease in internalizing and externalizing behavior.

The autonomy affirmation component might teach children to act according to their own goals and desires, whereas "regular" social skills interventions teach children to show prescribed behavior and rely on incentives to do so. Relying on and affirming children's internal motivation for positive behavior might improve children's internalizing and externalizing behavior because it helps them perceive (the change in) their behavior as emanating from their authentic selves, instead of an external force. It might also help children to internalize the idea that positive behavior allows them to reach goals—such as having friends or being positively evaluated—more easily (Deci & Ryan, 2000; Vansteenkiste et al., 2010). The behavioral change due to the autonomy affirmation component may not be contingent on those providing the intervention (as opposed to modeling behavior) and translates to outside the intervention context better. Affirming children's autonomy may also stimulate their engagement in the intervention, which might make children more apt to apply the competencies they learn in the intervention (Ryan et al., 2008).

The effect found for the intervention with autonomy affirmation may have been boosted by the positive attitude of school personnel towards this intervention. Trainers observed that teachers were enthusiastic about the autonomy-supportive language used in the intervention, and were motivated to apply this in their regular teaching. In contrast, the intervention without autonomy affirmation did not provide such a language for teachers. Previous research showed that intervention effects might be boosted when the child's environment is actively engaged in an intervention (e.g., Durlak et al., 2007; Department for Education, 2018). Such active involvement not only pertains to teachers but can be extended to include children's broader context of development (e.g., whole school and parents). The interventions implemented in this study did not actively involve children's parents, but teaching parents to use autonomy-supportive language at home may further enhance intervention effects.

Contrary to our expectation, neither the intervention with autonomy affirmation nor the intervention without autonomy affirmation had effects on children's prosocial behavior, social skills, self-efficacy, self-esteem, self-perceived competence and class climate that were larger than the changes in the control condition. These findings suggest that the interventions were equally *in*effective for these outcomes. Universal social skills interventions generally entail more extensive programs, and our findings suggest that four sessions implemented at the classroom level might not be a sufficient dosage to elicit behavioral changes and improve the classroom dynamic. In a recent meta-analysis, we found that a specific dosage of intervention components is related to their effectiveness; the inclusion of 10 to 20 exercises aimed at improving prosocial skills and problem-solving yielded the largest effects on children's social and emotional skills (de Mooij et al., 2020). The intervention with autonomy affirmation included nine exercises aimed at social skill acquisition, and the intervention without autonomy affirmation included eight of such exercises. Extending these interventions with additional sessions, and thus a higher dosage of components might result in more pronounced intervention effects. A recent microtrial into the effective components to improve children's social anxiety supports this idea. That study showed that brief interventions with either cognitive restructuring or exposure were effective in improving children's social anxiety. In comparison, a time-equivalent intervention with both components—each with a smaller dosage—sorted significantly fewer effects (de Mooij et al., submitted; see Chapter 3).

Finally, the analysis at the group-level may have caused significant intervention effects in subgroups of children to go unnoticed. Regular classrooms likely contain children with adequate social skills who may not benefit from a universal intervention to the same extent as children with a social skills deficit (e.g., Greenberg & Abenavoli, 2017). Analyzing intervention effects at the group-level may, therefore, have obscured differential effects in subgroups of children. For example, affirming autonomy may be more effective for children showing more externalizing problem behavior, which may be a reaction to experiencing a lack of self-determinance (Deci & Ryan, 2000). Additional analyses indeed found that the intervention with autonomy affirmation worked better for children that scored high on externalizing behavior at pretest 1 compared to children that scored lower on externalizing behavior at pretest 1. These findings should be interpreted with caution as there were only a few children that scored high on externalizing behavior and received the intervention with autonomy affirmation. Even so, these findings provide preliminary support for the notion that intervention components may have differential effects, an interesting avenue for future research. In this regard, not only baseline levels of externalizing behavior are of interest. Differential effects of the interventions may also emerge based on children's moral development as research has shown that moral affect and cognitions are related to prosocial behavior (e.g., Liable et al., 2014).

Limitations and Strengths

We relied on self-report data to assess children's prosocial behavior in this study. Using peer-nomination or teacher-report data might have provided a more encompassing view of children's changes on prosocial behavior and related outcomes as children might not

be able to reliably or accurately assess their prosociality (Nelson & Crick, 1999). Second, we did not collect data on social-emotional skills interventions implemented by schools in the year(s) before the study. In the Netherlands, schools are required by law to attend to children's social-emotional development, making it likely that schools implemented some form of social skills intervention already before the present study. To some extent, the fact that other interventions may have already been ongoing in the participating schools might have confounded our findings. Implementation of prior social-emotional skills interventions may also explain the improvements from pretest 1 to pretest 2 observed in all conditions. We did, however, exclude schools that had previously participated in Topper Training, so we are confident that children had not previously been exposed to the autonomy affirmation component as implemented for this study. Likely, schools that applied to our study were generally motivated to attend to their student's social-emotional development, which may have resulted in a sample with few social-emotional deficits beforehand. This was noted by trainers, too; they indicated that the school climate of participating schools was already quite positive, and children already seemed prosocial. Perhaps, this limited our ability to find significant improvements on prosocial behavior.

This study also holds several strengths. To our knowledge, this is the first microtrial ever to examine the extent to which an autonomy affirmation component in a social-emotional skills intervention has added benefit when improving children's prosocial behavior. The autonomy-supportive language included in the intervention directed at affirming children's autonomy and prosocial intentions can be implemented in existing social-emotional skills programs easily, which substantiates the practical relevance of our findings. Furthermore, our study was well-powered, increasing the confidence with which we can draw our conclusions. Another strength was the inclusion of a follow-up and a broad measurement approach as it allowed us to assess both the longer-term effects of the intervention with and without autonomy affirmation and enabled us to find effects on outcome domains that we would have otherwise missed. Finally, using a sophisticated latent change modeling approach enabled us to paint a distinct picture of the additive effect of addressing children's autonomy in a preventive intervention context.

Future research on this topic may implement extended interventions and include an extended follow-up measurement to examine if the effect of affirming children's autonomy in a social-emotional skills intervention takes more time to become apparent. More research into (the interplay of) the determinants of children's (pro)social behavior could provide insights that may be beneficial for these interventions. Insights into children's motivation to behave prosocially may aid the development or adjustment of intervention components to specifically target this motivation (e.g., Eisenberg et al., 2016). Finally, we recommend recruiting a large enough sample to reach sufficient power to conduct subgroup analyses. It may be insightful to differentiate children based on moral development, for example, as it is likely that not all children benefit from a universal intervention to the same extent.

Conclusions

We evaluated the additive effect of an autonomy affirmation component in a universal social-emotional skills intervention, which yielded several conclusions with practical relevance. Our study suggests that teaching children they have a choice in how to behave and reminding them of their responsibility to behave according to their (prosocial) intentions can reduce children's internalizing and externalizing behavior. Satisfying children's need for autonomy may be just as important as enhancing children's skills (i.e., satisfy the need for competence) and stimulating connection and trust (i.e., satisfy the need for relatedness) when aiming to change children's behavior.

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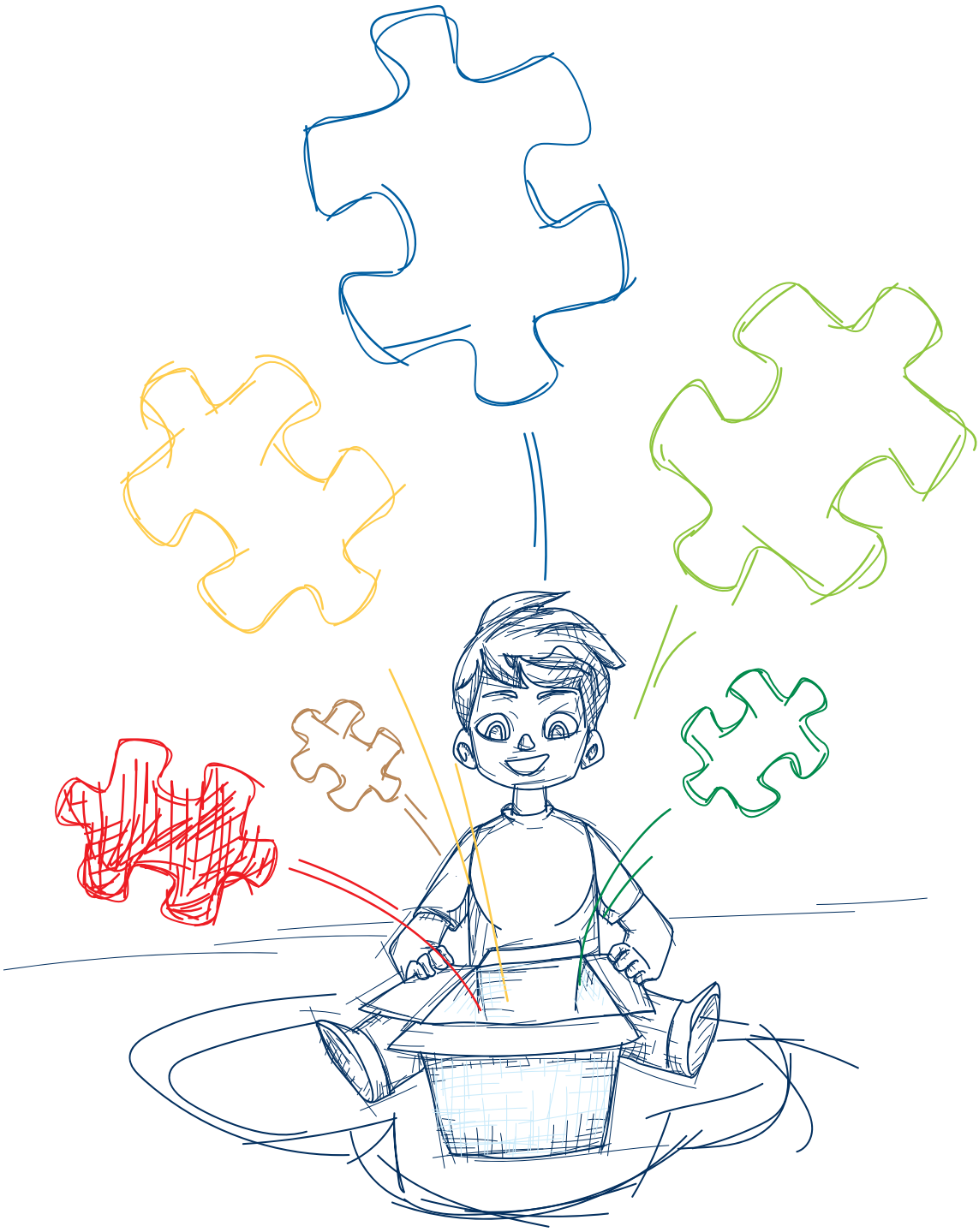


CHAPTER 6.

Summary and General Discussion: Unpacking the Black Box of Social-Emotional Skills Interventions

Aim of This Dissertation

It is a common view that multi-component interventions yield superior effects on children's social-emotional development (e.g., Goldberg et al., 2019). Intuitively, this idea seems convincing, as targeting multiple behavioral deficits at the same time seems more efficient than targeting deficits one by one. However, because intervention research has predominantly assessed multi-component interventions in terms of the complete intervention package, current evidence mostly tells us about the effectiveness of a combination of intervention components exactly as structured in specific interventions (Chorpita et al., 2005a). As a result, it remains unclear which components drive intervention effects and this can leave researchers pondering the contents of the black box of multi-component interventions. Therefore, a different intervention research approach is much needed.

To our knowledge, this dissertation features the first-ever set of studies assessing the effects of individual social-emotional skills intervention components. Examining interventions in terms of separate components can guide researchers, intervention developers, and professionals in the field to more critically consider the composition of childhood interventions and better match these interventions to children's needs. Furthermore, this information provides direction to evaluate and optimize existing social-emotional skills interventions. Knowing which intervention components are effective also allows for a modular approach (i.e., using intervention components as free-standing modules) to prevent social-emotional skill deficits and related problem behavior in children (Weisz et al., 2012). Finally, brief single-component interventions may benefit the quality of implementation, as these might be more time-efficient and cost-effective to implement than multi-component social-emotional skills interventions (Durlak, 2015). There are thus ample reasons to examine individual intervention components, and this dissertation took a first step towards opening the black box of childhood social-emotional skills interventions. This dissertation examined the question: "*What components of preventive childhood social-emotional skills interventions drive intervention effects?*". This final chapter of the dissertation summarizes and discusses its findings (see Table 1 for an overview), addresses which questions remain unanswered, and provides suggestions for future research and practice.

Summary of Main Findings

Chapter 2 presented a multilevel meta-analysis that assessed whether separate intervention components are related to the effects of childhood social-emotional skills interventions reported in previous intervention studies. We collected 60 social-emotional skills interventions and coded the individual exercises using a taxonomy developed for this study. We found that, overall, social-emotional skills interventions yielded a significant, small effect on children's and adolescents' interpersonal and emotional skills (d = .369, 95% CI [.292,.447], p < .001). Assessing the effects of individual intervention components showed that the inclusion of psychoeducation (i.e., transfer of knowledge about behavior or group processes and social roles) and skill-building (i.e., exercises aimed at enhancing interpersonal behavior) in the intervention was related to larger intervention effects. We also found that the dose of delivery of these components matters. Specifically, the inclusion of three to six exercises

of psychoeducation and 11 to 20 skill-building exercises was related to larger effect sizes of social-emotional skills interventions on children's interpersonal and emotional skills. The inclusion of psychophysical components was not related to intervention effects.

In Chapters 3, 4 and 5, we took a closer look at the effects of specific intervention components using a microtrial approach. This approach uses randomized experiments to examine the effects of brief and focused manipulations (Howe et al., 2010). These studies focused on three behavioral outcomes, all of which are often targeted in current multi-component social-emotional skills interventions and are highly relevant for school-age children: social anxiety, (low) self-esteem, and prosocial behavior. All three-arm microtrials included four repeated measures. Pretest 1 was completed approximately five weeks before the start of the intervention, pretest 2 was completed one week before the start of the intervention, posttest was completed one week after the intervention had ended, and follow-up was completed approximately three months after the intervention had ended. Schools participated in only one of the three microtrial studies, and in only one condition, to prevent spill-over effects. To ensure a naturalistic setting and benefit the generalizability of our findings, the intervention components of each microtrial were provided in the school-context in the three highest grades of participating Dutch elementary schools by certified and experienced professionals.

In **Chapter 3**, we evaluated whether a brief group intervention with either exposure (n = 82, M_{age} = 10.32 years, SD = .95), cognitive restructuring (n = 73, M_{age} = 10.64 years, SD = 1.12) or a combination of both components (n = 36, M_{age} = 10.53 years, SD = 1.18) was successful in improving social anxiety and anxiety-related outcomes in children with elevated symptoms. Children were invited to participate in the interventions if they scored above their class average on social anxiety at pretest 1. We found that exposure and cognitive restructuring as separate intervention components were similarly effective in reducing children's social anxiety and anxiety-related behavior. The effects found for both separate components were sustained up to three months after the end of the intervention. The intervention combining exposure and cognitive restructuring yielded fewer effects, and these effects were not larger than the effects found for either individual component intervention.

In **Chapter 4,** we evaluated whether brief group interventions with either cognitive restructuring (n = 63, M_{age} = 10.69 years, SD = .92) or psychophysical exercises (n = 60, M_{age} = 10.61 years, SD = 1.06) were successful in improving children's self-esteem and self-esteem-related outcomes. We also compared these single-component interventions to a no-treatment control group (n = 63, M_{age} = 10.67 years, SD = 1.07). Children in the experimental groups were invited to participate in the intervention if they scored below their class average on self-worth and assertiveness at pretest 1. We found that cognitive restructuring yielded delayed effects on children's thoughts and behavior: children reported feeling more self-worthy and competent, and having less negative automatic thoughts three months after the end of the cognitive restructuring intervention compared to children in the control group. Importantly, the psychophysical component did not yield any immediate or follow-up effects on self-esteem and self-esteem-related outcomes that were significantly larger than the changes in the control group.

In **Chapter 5**, we evaluated whether an autonomy affirmation component yielded additive effects in universal social-emotional skills interventions aimed at enhancing children's prosocial behavior. The set-up for this microtrial was slightly different from the previous two microtrials, in that it did not assess single-component interventions in a subgroup of children with specific symptoms (i.e., social anxiety or low self-esteem). Instead, the interventions included both skill-building exercises and cognitive-emotional exercises, and targeted the whole class (i.e., implemented separately per grade level). An intervention with autonomy affirmation component (n = 243, M_{age} = 10.46 years, SD = 1.04) was compared to an intervention without autonomy affirmation component (n = 157, M_{age} = 10.47 years, SD = .86), and a no-treatment control group (n = 379, M_{age} = 10.76 years, SD = .86). We found that a social-emotional skills intervention with autonomy affirmation had superior effects compared to an intervention without autonomy affirmation and a no-treatment control group. Specifically, children reported less internalizing and externalizing behavior three months after the end of the intervention with autonomy affirmation compared to children that participated in the intervention without autonomy affirmation and children in the control group.

Table 1. *Overview of the Findings of this Dissertation.*

Chapter	Target Skill	Findings	Practical Implications
Section 1.			
2.	Interpersonal and emotional skills	Three to six psychoeducational exercises and 11 to 20 skill-building exercises are related to the largest effect sizes of social-emotional skills interventions on interpersonal and emotional skills outcomes. Psychophysical exercises are not related to intervention effects.	Social-emotional skills interventions should include a sufficient dose of psychoeducation and skill-building exercises.
Section 2.			
3.	Social-anxiety	Exposure is effective in improving children's social anxiety, anxious behavior, distress, avoidant behavior, approach behavior, positive thoughts, perceived social threat, internalizing behavior, social skills, and self-perceived competence. Cognitive restructuring is effective in improving children's social anxiety, anxious behavior, distress, avoidant behavior, approach behavior, positive thoughts, perceived social threat, internalizing behavior, self-efficacy, and self-perceived competence. A combination of exposure and cognitive restructuring is not effective in improving children's social anxiety and anxiety-related outcomes.	Interventions targeting children's social anxiety should include exposure or cognitive restructuring.
4.	Self-esteem	Cognitive restructuring is effective in improving self-worth, self-perceived competence, and automatic thoughts. Psychophysical exercises are not effective in improving children's self-esteem and self-esteem-related outcomes.	Interventions aimed at improving children's self-esteem should include cognitive restructuring
5.	Prosocial behavior	Autonomy affirmation yields positive effects on children's internalizing and externalizing behavior.	Interventions aimed at promoting children's prosocial behavior should include autonomy affirmation.

Key Conclusions on Effective Components and Dose of Delivery

Two main inferences can be drawn from our findings. First, not all intervention components work equally well to improve children's social-emotional skills and behavior. Second, the dose with which the intervention components are delivered matters.

Effective Intervention Components

Combining the previously summarized findings shows that (i) psychoeducation is related to stronger social-emotional skills intervention effects (Chapter 2), (ii) the psychophysical component does not seem to be beneficial when trying to improve children's social-emotional skills and behavior (Chapters 2 and 4), (iii) practicing target behavior (i.e., skill-building component) and cognitive restructuring do seem to sort effects on children's social-emotional skills and behavior (Chapters 2, 3, and 4), and (iv) the inclusion of an autonomy affirmation component in social-emotional skills interventions leads to a stronger decrease in children's internalizing and externalizing behavior (Chapter 5).

Several explanations may underlie these findings. Perhaps skill-building components (e.g., exposure) and cognitive-emotional components (e.g., cognitive restructuring) are effective in improving children's social-emotional behavior because both of these components directly target concrete skills that are important for children's social functioning. To illustrate, a child with negative emotion patterns might benefit from exposure exercises because these directly focus on the situation that evokes negative emotions. Similarly, this child might benefit from cognitive restructuring exercises because these directly focus on the thoughts that trigger negative emotions. Psychophysical components, on the other hand, might be too indirect to yield effects. Psychophysical exercises (e.g., balancing or posture exercises) use bodily movement to generate bodily feedback. The bodily feedback then needs to be translated into changes in cognitions and emotions (e.g., Glenberg et al., 2013). This indirect mechanism of change might explain why using such components in social-emotional skills interventions may not result in meaningful changes. Psychoeducation likely is an essential component for social-emotional skills intervention because it provides children with knowledge about target behavior and allows them to optimally benefit from the intervention components that follow (e.g., Brown, 2018). This implies that there might be an interaction effect between psychoeducation and other intervention components (see "Suggestions for Future Research and Practice"). Finally, stimulating children's autonomy likely improves intervention effects because the ability to achieve significant behavior change depends on individuals' perception that new-learned behavior is self-advocated instead of externally motivated (Ryan & Deci, 2017).

Dose of Delivery Of Intervention Components

The second principal conclusion of this dissertation is that the dosage of intervention components plays a vital role in intervention effectiveness. Our meta-analysis (Chapter 2) showed that specific dosages of intervention components yielded optimal effects, while higher and lower dosages yield smaller effects (i.e., curvilinear effects). The effects observed across our microtrials show that the interventions with sufficient component exercises yielded more significant effects (i.e., on more outcomes measured) than the interventions that did not include a sufficient dose of components. Concretely, the

exposure intervention and cognitive restructuring intervention aimed at improving social anxiety (Chapter 3) and the cognitive restructuring intervention aimed at improving self-esteem (Chapter 4) all included sufficient skill-building and cognitive-emotional exercises when one relates this to the findings from our meta-analysis (Chapter 2)[1], and all yielded significant effects. By contrast, the intervention that combined exposure and cognitive restructuring (Chapter 3), and the interventions with and without autonomy affirmation aimed at enhancing children's prosocial behavior (Chapter 5) included fewer than ten skill-building exercises and fewer than six cognitive-emotional exercises (as would be recommended based on Chapter 2). All three of these interventions yielded fewer significant effects.

At large, our findings seem to indicate that implementing a too-small dose of intervention components to improve children's social-emotional functioning may hamper the accumulation of intended intervention effects (e.g., Chapters 3 and 5). Targeting multiple behavioral and cognitive aspects in an intervention, and stacking components to do so, might thus increase the risk of including intervention components in a too-small dose. Indeed, it seems that targeting concrete behavior with a sufficient dose of a specific component is more effective. Perhaps, targeting a central skill—with the right component and dose—could set other behavioral changes into motion in the network of social-emotional skills (see "Suggestions for Future Research and Practice"). If this notion holds, this might even mean that multi-component interventions are superfluous. In other words, it may be the case that when we intervene on children's social-emotional skills, less (but enough) is more.

Suggestions For Future Research and Practice

Based on this dissertation, several suggestions for future research can be made that may serve as helpful pointers on how to further unpack the black box of social-emotional skills intervention effects for children.

Intervention Components to Consider

Current social-emotional skills interventions include many different intervention components, so the question remains which intervention components not assessed in this dissertation may also have significant contributions to intervention effects. As explained using the SOCIAL model (Beauchamp & Anderson, 2010; Chapter 1), various processes contribute to children's adequate social-emotional functioning. It is thus likely that other intervention components are also essential to improve children's social-emotional skills. For example, meta-analyses have shown that teaching problem-solving skills was related to positive outcomes in children, adolescents, and adults (e.g., Denham & Almeida, 1987; Malouff et al., 2007), which suggests a problem-solving intervention component is a critical factor in the effectiveness of social-emotional skills interventions.

1 At face value, the findings from our meta-analysis implied that there was also a dosage effect for the cognitive-emotional component category whereby six to 15 exercises were related to larger intervention effects.

As suggested by Boustani and colleagues (2015), problem-solving may even be regarded as a meta-component, as it encompasses multiple lower-order skills (i.e., emotion regulation, planning) and applies to a wide range of problem behaviors and situations.

Similarly, previous research showed that social-emotional skills interventions were more successful in improving children's prosocial behavior when they, at least partly, focused on enhancing children's empathy (Malti et al., 2016). As empathy is regarded as a determinant of prosocial behavior (e.g., Eisenberg et al., 2016) and research suggests that emotion regulation mediates the association between empathy and prosocial behavior (Lockwood et al., 2014), intervention components to enhance children's empathy and emotion regulation might also be vital in enhancing children's prosocial behavior. If such intervention components are effective in improving children's prosocial behavior indirectly, this may also mean that prosocial behavior is a too-distal psychological variable to influence using social-emotional skills interventions. Targeting more proximal, key variables (e.g., empathy and emotion regulation) with concrete intervention components may prove more effective (see "A Complexity Approach to Intervention Component Research").

Future research should not only focus on a broader spectrum of content-related, child-focused intervention components (i.e., practice elements, Chorpita et al., 2005a) but also address the question to what extent "common" factors such as the therapist's belief in the intervention, professional experience, and therapeutic relationship drive intervention effects (Messer & Wampold, 2002; Wampold et al., 1997). Research has shown that substantial variance in intervention outcomes is predicted by common factors such as therapeutic alliance, which shows that these are essential intervention components to consider (Laksa et al., 2014) and calls for more attention to common factors in intervention research.

Besides common factors, ecological components (referred to as external factors in the SOCIAL model; Beauchamp & Anderson, 2010) such as involving parents in an intervention can play a role in intervention effectiveness (e.g., Meyers et al., 2012). It has been posed that parents and schools share the responsibility of children's social development (e.g., Gaffney et al., 2019), and actively involving children's home-environment might be a defining intervention component (Durlak et al., 2007; Goldberg et al., 2019; Weare & Nind, 2011). The notion that parenting has an important influence on children's social-emotional behavior is widely accepted (e.g., Healy et al., 2015). For example, parental warmth is thought to promote prosocial behavior (e.g., Daniel et al., 2016), and parenting can even be pointed out as an etiological factor that predicts the onset of adverse well-being outcomes such as social anxiety (Spence & Rapee, 2016). Including a parenting component in social-emotional skills interventions might strengthen intervention effectiveness because it might improve the transfer of learned social-emotional skills to a context outside of the intervention (e.g., Durlak et al., 2007; Fishel & Ramirez, 2005; Smith et al., 2020).

Similarly, children's social context might be an important ecological factor to consider when assessing intervention effects. A recent meta-analysis showed that whole-school social-emotional skills interventions have small, significant effects on children's social and

emotional adjustment (*d* = .22), but it cannot be inferred if the mean effect found is driven by the whole-school component of the interventions (Goldberg et al., 2019). Targeting children's social context may be necessary, however. For example, children's closeness to others may influence the expression of social-emotional competence. Children may behave more prosocially towards children they feel connected to as opposed to children they like less (Spinradt & Gal, 2018), and prosocial behavior may decrease after social exclusion (Twenge et al., 2007). Self-esteem also seems dependent on the child's closeness to the subjects of comparison (e.g., Gorresse & Ruggieri, 2013; Tesser et al., 2000). According to the "big fish, little pond"-proposition, how happy children feel about themselves partly depends on the qualities of the subjects to whom they are comparing themselves. Children may feel very good about themselves in a group of children that performed poorly on a specific task compared to them but may feel much less satisfied with their performance when they are in a group of children that all perform very well (Bukowski & Raufelder, 2018). Depending on the social context, children may underestimate the competencies they base their self-esteem or fear of negative evaluation on (Baumeister et al., 2003; Miers et al., 2009). If this were the case, a different intervention approach would be needed than if they indeed show a deficit on those competencies. Interestingly, considering that both social anxiety and self-esteem seem to be grounded in how we think others evaluate us, it may not be a coincidence that cognitive restructuring yielded effects on both social-emotional outcomes in our microtrials.

Measuring Dosage of Intervention Components

In addition to assessing intervention component dose by looking at the *number* of exercises per intervention component category included in interventions (Chapter 2), future research might assess the *percentage* of intervention components included in social-emotional skills interventions. Assessing the dose of content-related intervention components while taking intervention structure characteristics (e.g., duration and number of sessions) into account may provide a more accurate picture of the differential effects related to the dosage of separate intervention components. It may also be necessary to consider that in group interventions, the dose of an intervention component that individual children receive may, in fact, be lower than intended. For example, because trainers may unintentionally pay more attention to some children than others, or an exercise may not allow enough time for all children to complete a roleplay. Mapping the exact dose of intervention components that individual children receive (e.g., using observational data) may provide complementary information about the optimal dose of intervention components.

An Overarching Taxonomy for Social-Emotional Skills Interventions

Research into the effects of social-emotional skills intervention components would greatly benefit from a fixed terminology—the taxonomies that we based our taxonomy on showed that this is currently not the case (Chorpita & Daleiden, 2009; Michie et al., 2013; Veerman et al., 2015). Even though it may not be advisable to add yet another framework to organize social-emotional skills and the components that target them (Jones et al., 2019), we argue that the SOCIAL model (Beauchamp & Anderson, 2010; summarized in Chapter 1) is a good starting point for an all-encompassing taxonomy of social-emotional

skills intervention components. A framework based on the SOCIAL model would require some extensive rearranging of the intervention components in our taxonomy, but would have a more robust theoretical and empirical foundation and would likely provide new insights into which intervention components drive intervention effects. For example, in our taxonomy, problem-solving and exposure are both categorized as skill-building components. A new taxonomy based on the SOCIAL model would categorize problem-solving as an intervention component at the attention-executive level and exposure as an intervention component at the social attribution level (Beauchamp & Anderson, 2010). This taxonomy could also differentiate between practice elements and instructional elements. Psychoeducation would then fall under the latter, as this component aims to deliver information to the participants (Boustani et al., 2015). Based on the findings from Chapters 2 and 4, this new taxonomy may not want to consider psychophysical exercises as a type of component, as we did not find these exercises to be effective, but rather as a mode of delivery (i.e., similar to role-play and modeling). As a final remark, previous research into intervention components has overlooked the value of the autonomy affirmation component (Chapter 5)—which shows from the fact that this component was not in any of the previous taxonomies—but our study has shown that this is an important intervention component. A new taxonomy should thus be viewed as a dynamic entity—a continually developing document that can be adjusted following new research insight and findings.

A Data Pooling Approach to Intervention Component Research

A data pooling approach to intervention component research might complement findings from microtrials like the ones presented in this dissertation. Assessing what works using microtrial studies requires a substantial time-investment and, as such, assessing all individual intervention components would require decades of research. Studies that pool existing data might be useful to speed up our efforts to find out what works. Using an individual participant data (IPD) approach generally guarantees larger power and allows for a more thorough assessment of intervention component effects (e.g., Hensums et al., in preparation; Riley et al., 2010). For example, an IPD approach could allow for the assessment of lower-order intervention component effects (e.g., exposure exercises or a trust-fall exercise), besides assessing higher-order categories of interventions components (i.e., psychoeducation, psychophysical components, skill-building components, and cognitive-emotional components) as was done in Chapter 2.

IPD analysis also allows for a well-powered assessment of additive interaction effects, sequence effects, and synergistic interaction effects of intervention components (i.e., when the cumulative effect of two components is larger than the effects of the individual components alone). A recent meta-analysis of parenting intervention effects showed an additive effect of relationship enhancement to the effects of behavior management children's disruptive behavior; a side note here is that this was only the case for treatment programs and not for preventive programs (Leijten et al., 2018). A recent qualitative comparative analysis revealed that teaching parents' self-management strategies alongside improving parenting strategies was a pathway to positive effects of interventions to prevent physical child abuse (Melendez-Torres et al., 2019). At large, specific combinations of intervention components may amplify intervention effects, and

it is likely that, as with parenting interventions, "golden couples" of social-emotional skills intervention components yield synergistic or additive intervention effects. A component that may be part of a golden couple of intervention components is psychoeducation. The intervention with exposure, with cognitive restructuring, and combining both components (Chapter 3), all started with three exercises of psychoeducation about (social) anxiety, which our meta-analysis (Chapter 2) showed to be related to intervention effectiveness. An IPD approach may allow us to assess if the fact that the psychoeducation component preceded the exposure and cognitive restructuring component boosted the intervention effects found in Chapter 3.

Furthermore, an IPD approach not only allows us to assess *what works* but also *for whom* intervention components work—which is a vital next step in intervention research. A recent IPD meta-analysis that assessed *what works* did not find individual components were related to anti-bullying intervention effects. However, assessing *what works for whom* showed that some intervention components (e.g., psychoeducation) were differentially effective for girls and boys and children reporting lower and higher levels of bullying and victimization at baseline (Hensums et al., in preparation). Presumably, intervention components of social-emotional skills interventions also have differential effects on subgroups of children. The additional analyses performed in Chapter 5 provide some support for this hypothesis. Our findings suggested that children with high levels of externalizing behavior might benefit more from an intervention with autonomy affirmation compared to children with lower levels of externalizing behavior. Intervention components may also have differential effects based on children's baseline level of empathy (Malti et al., 2016). Components to improve social anxiety (Chapter 3) may have differential effects based on children's behavioral inhibition (e.g., Clauss & Blackford, 2012), and components aimed at enhancing self-esteem may have differential effects based on personality variables such as negative affectivity (e.g., Brown & Marshall, 2001).

A Complexity Approach to Intervention Component Research

To be able to infer the exact process of change that intervention components bring about, we urge future research to take a complexity science approach (Hayes & Strauss 1998; Hayes & Andrews, 2020). Taking a complexity science approach means viewing social-emotional skills as the patterns and processes that maintain social-emotional competence instead of being isolated components of behavior. Rather than viewing multi-component social-emotional skills interventions as a "cocktail" of ingredients that blend to influence individual social-emotional skills, a different metaphor may be more suitable: intervention components are mechanic gears that can be activated in the social-emotional skills "machine". In such a machine, a gear (i.e., intervention component) activates an adjacent gear (e.g., a social-emotional skill or another intervention component), which in turn affects another, and so forth. The challenge that lies ahead is to continue mapping which gears make up the machine, to map which gears are connected, which gears should be activated first, and how these gears set each other in motion.

A better understanding of the social-emotional competence network may be a prerequisite to better understanding intervention (component) effects. The network approach to psychopathology (Borsboom, 2017; Borsboom & Cramer, 2013) conceptualizes symptoms

as interrelated nodes in a network in which the activation of a symptom can activate a connected variable, such as symptoms of mental disorders, but also cognitive, biological, and social variables that contribute to the emergence of these disorders (Jones et al., 2017). Previous research has already applied network analysis to specific disorders, such as social anxiety disorder, depression, and post-traumatic stress disorder (Heeren & McNally, 2016; McElroy et al., 2018; Robinaugh et al., 2020), but not yet to social-emotional functioning. The network for social-emotional skills (deficits) could be based on the SOCIAL model (Beauchamp & Anderson, 2010), with the network nodes representing the various socio-cognitive factors that play a role in the emergence of social-emotional functioning. In approaching social-emotional competence as a network of causal variables, intervention components can be viewed as the efforts to influence these variables directly or change the connection between the network nodes (see Figure 1; Borsboom, 2017). The weaker the connections (i.e., edges) between symptom nodes are, the quicker activation of symptoms may fade out and allow the network to return to a state of equilibrium (i.e., social competence; Borsboom, 2017). Figure 2 applied the SOCIAL model to the network analysis approach, as explained by Borsboom (2017), to offer a visual representation of how a social-emotional skills intervention network could *hypothetically* look.

Figure 1. *An adaptation of the network theory modeled by Borsboom (2017) to show how intervention components could hypothetically be included in the network.*

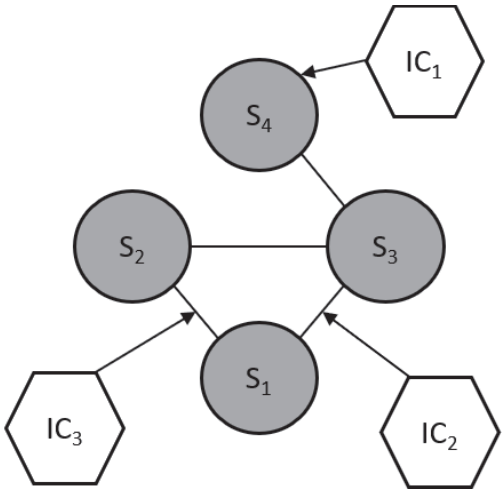
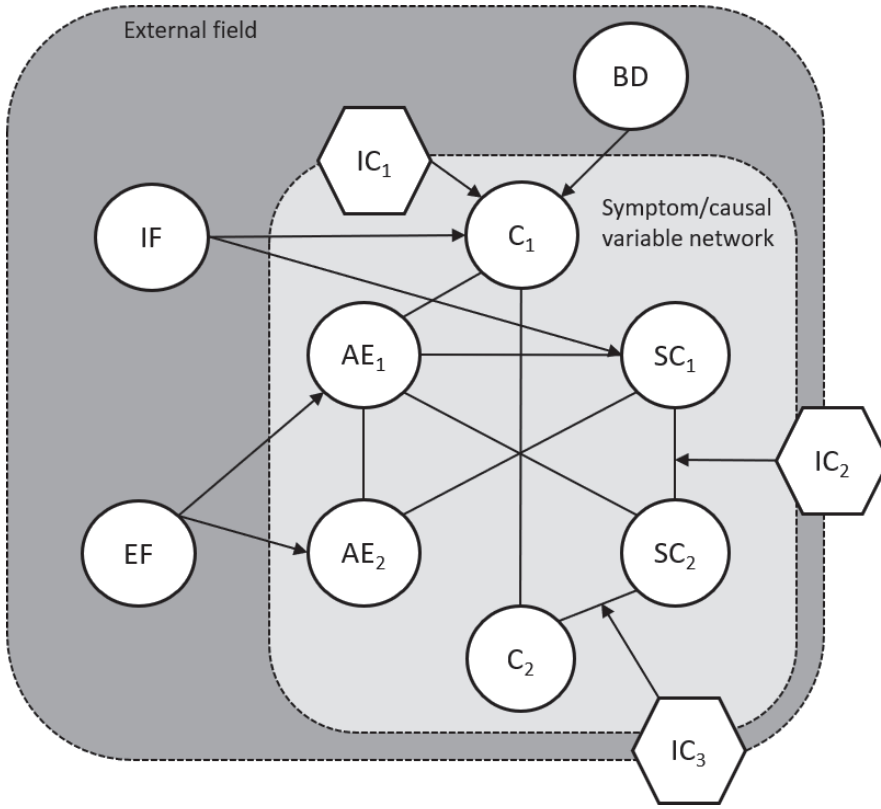


Figure 2. *A hypothetical network of social-emotional functioning adapted from Figure 1 in Borsboom et al. (2017) and based on the SOCIAL model (Beauchamp & Anderson, 2010), with two attention-executive factors (AE_1, AE_2), two communication factors (C_1, C_2), and two socio-emotional factors (SC_1, SC_2). External factors (i.e., mediators in the SOCIAL model) can affect the cognitive functions in the network. These factors are internal (IF), external factors (EF), and brain development (BD). Intervention components may influence a factor directly (IC_1) or alter the interaction between factors (IC_2, IC_3).*



The network approach might also shed light on the comorbidity of disorders, such as the comorbidity of social anxiety disorder with other anxiety disorders and depression (Spence & Rapee, 2016). McElroy and colleagues (2018) previously found suggestions that anxiety and depression in children and young adolescents are both domains of a more extensive psychopathology network. As network analysis can show the interplay between psychological variables, it can provide suggestions for the psychological variables that should be targeted to create a cascade effect (i.e., which gear is the central gear that sets others into motion). Analysis of the social anxiety disorder network showed that avoidance of social situations predicted general alertness to social threat and, in turn, this increased fear of social situations. As proposed by the researchers, targeting the node that exerts the most substantial influence on the maintenance of social anxiety may hold therapeutic value because it may cause a cascade of benefits (Heeren & McNally, 2016). Applied to the findings in this dissertation, this may mean that addressing the

most central node in the network of social anxiety (e.g., with exposure or cognitive restructuring; Chapter 3) sets connected gears into motion that materialize into improved social anxiety and anxiety-related outcomes.

Mapping the network of social-emotional development could also prove exceedingly insightful for our understanding of self-esteem. Self-esteem is a complex construct, which might be an outcome of other psychosocial variables, such as a sense of belongingness, social inclusion, the ability to solve problems, or self-compassion (Dumont & Provost, 1999; Leary & Baumeister, 2000; Neff, 2011). Knowing how best to improve children's self-esteem highly depends on knowledge of the position of self-esteem in the social-emotional competence network. If self-esteem were contingent on other psychological variables, this might mean that addressing a node in the social-emotional competence network that is connected to self-esteem (e.g., belongingness) is effective in improving self-esteem indirectly. Moreover, we may not sufficiently understand if self-esteem is a trait or a state (e.g., Bukowski & Raufelder, 2018; Beauchamp & Anderson, 2010; Kernis, 2005; Tzresniewski et al., 2006) and if self-esteem is static or dynamic (e.g., Baldwin & Hoffmann, 2002) to address low self-esteem effectively.

As the network of social-emotional competence becomes clear, network comparison tests (e.g., van Borkulo et al., 2017) can compare the strength of the node-connections in networks from different groups receiving different intervention components. Firstly, this could show whether intervention components are successful in changing the network under scrutiny. Secondly, this could show which connections between nodes were changed, thus providing indications for how an intervention component might work. Network intervention analysis (Blanken et al., 2019) allows for graphical visualization of intervention effects on psychological variables and associations between variables while controlling for the associations with all other variables. In this approach, the intervention is the independent between-subjects variable, and changes in symptom or skill variables are the dependent variables. As is explained by Blanken and colleagues (2019), psychological variables cannot influence the intervention/treatment node. The edges (i.e., the partial correlations between nodes) between the intervention and psychological variables thus show which variables are directly affected by the intervention. By including multiple time points in a study, network intervention analysis might show how the direct effects of intervention components spread through a network through the association of variables to each other (i.e., indirect intervention effects). In this way, network intervention analysis can show how an intervention diminishes the strength of connections between nodes (i.e., symptoms; e.g., Madhoo & Levine, 2016) and map the direct and indirect effects of an intervention (e.g., Mullarkey et al., 2019). Moreover, network analysis can show the differential effects intervention (components) has on a symptom network and how associations between psychological variables reorganize (or not) after an intervention (e.g., Blanco et al., 2020), and can be used to assess if specific symptoms become less important within a network (e.g., Berlim et al., 2020).

In Chapter 3, we hypothesized that cognitive restructuring might be effective in improving socially anxious children's self-efficacy because this component is successful in improving children's positive thoughts. Assessing the intervention component effect of cognitive

restructuring using network intervention analysis based on data from multiple time points may show how the mechanisms that underlie the effects of cognitive restructuring works by assessing the patterns of change in the network elicited by the intervention component. Also, our findings suggested that the effect of exposure on avoidant behavior needs time to become observable (Chapter 3). Graphical representation of how the network of variables changes over time could provide valuable insights into the possible cascade of effects of intervention components. This aids the understanding of intervention mechanisms and provides information for their optimization (Blanken et al., 2019). On a similar note, we hypothesized that cognitive restructuring might improve children's negative thoughts, which then cascades into more assertive behavior, more peer acceptance, and more self-perceived competence (Chapter 4). Network analysis could allow us to assess if this hypothesis holds. Finally, the network approach may also provide insight into additive, sequence, and synergistic effects of intervention components.

Future researchers that want to apply network analysis should consider that that to accurately map the chain of changes in a network due to an intervention requires (i) a substantial sample, (ii) experience sampling methods (if one wants to make individual-level inferences about the network structure, *what works for whom*), (iii) multiple time points, and (iv) short intervals between these time points (e.g., Boschloo et al., 2019; Robinaugh et al., 2020).

Final Conclusion

It is evident from this dissertation that the notion that "more is more" and "one size fits all" does not hold for preventive social-emotional skills interventions. We have shown that not all separate components of social-emotional skills interventions are equally effective in improving children's and adolescents' social-emotional competence and that the dosage of intervention components matters. Our research encourages the use of concrete, well-structured intervention components for specific target areas of children's behavior. It seems that components that are proximal to the targeted behavior (e.g., targeting avoidant behavior in socially anxious children with exposure) show the most beneficial intervention effects. This dissertation has shown the importance of evaluating social-emotional skills interventions in terms of their effective components instead of assessing these programs as complete packages and, maybe even more importantly, the dire need for research into *what works for whom* in social-emotional skills intervention. Instead of the continued development of new social-emotional skills interventions, the field should focus on further unpacking the black box of interventions and move towards a set of intervention blueprints using cutting edge techniques such as data pooling or a dynamic systems approach.

6

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CONTRIBUTIONS OF AUTHORS

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Contributors: All authors designed the study. BdM conducted literature searches, coded the studies, and conducted the statistical analyses. BdM wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

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Contributors: AM, BdM, GO, MF, and RS designed the study. AM, BM, and MF designed the interventions implemented. BdM collected the data and conducted the statistical analyses. AvdA assisted with the statistical analyses. BdM wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

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Contributors: BdM, GO, MF, and RS designed the study. BdM collected the data and conducted the statistical analyses. AvdA assisted with the statistical analyses. BdM wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

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Contributors: BdM, GO, LV, MF, and RS designed the study. BdM, LV, and MF designed the interventions. BdM collected the data and conducted the statistical analyses. AvdA assisted with the statistical analyses. BdM wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

APPENDICES CHAPTER 2

Appendix A.

Full search string used for the collection of the featured studies.

Component #1 Proximal outcome
social skills/ OR social skills training/ OR (((social* OR socio* OR intrapersonal OR interpersonal) ADJ3 skill*) OR interpersonal competenc* OR intrapersonal competenc* OR social competenc* OR soci* emotional learning OR peer relations).ti,ab,id.

Component #2 Distal outcome
assertiveness/ OR test anxiety/ OR performance anxiety/ OR emotional control/ OR anger control/ OR prosocial behavior/ OR (assertive* OR coping strateg* OR (test ADJ3 anxiety) OR resilience OR prosocial OR performance anxiety OR emotional control OR anger control).ti,ab,id.

Component #3 Type of training
intervention/ OR social skills training/ OR training/ OR school based intervention/ OR group intervention/ OR (training* OR intervention* OR program*).ti,ab,id.

Component #4 Target audience
(school age 6 12 yrs OR adolescence 13 17 yrs).ag. OR elementary school students/ OR primary school students/ OR middle school students/ OR junior high school students/ OR high school students/ OR (child* OR kid OR kids OR prepubescen* OR prepuberty* OR teen* OR young* OR youth* OR juvenile* OR girl* OR boy* OR preadolesc* OR adolesc* OR elementary school* OR primary school* OR K-12* OR K12 OR 1st-grade* OR first-grade* OR grade 1 OR grade one OR 2nd-grade* OR second-grade* OR grade 2 OR grade two OR 3rd-grade* OR third-grade* OR grade 3 OR grade three OR 4th-grade* OR fourth-grade* OR grade 4 OR grade four OR 5th-grade* OR fifth-grade* OR grade 5 OR grade five OR 6th-grade* OR sixth-grade* OR grade 6 OR grade six OR intermediate general OR secondary education OR secondary school* OR 7th-grade* OR seventh-grade* OR grade 7 OR grade seven OR 8th-grade* OR eight-grade* OR grade 8 OR grade eight OR 9th-grade* OR ninth-grade* OR grade 9 OR grade nine OR 10th-grade* OR tenth-grade* OR grade 10 OR grade ten OR 11th-grade* OR eleventh-grade* OR grade 11 OR grade eleven OR 12th-grade* OR twelfth-grade* OR grade 12 OR grade twelve OR junior high* OR highschool*).ti,ab,id.

Component #5 Type of study
(followup study OR systematic review OR meta analysis OR "treatment outcome/clinical trial").md. OR followup studies/ OR (random* OR longitud* OR ((follow up OR followup) ADJ3 (study OR studies)) OR ((interaction OR direct OR indirect OR causal OR generali#ed OR treatment) ADJ1 (effect OR effects)) OR (control ADJ3 group*) OR repeated measure* OR treatment condition* OR control condition* OR quasi experiment* OR quasiexperiment* OR RCT).ti,ab,id.

Search syntax:
(1 OR 2) AND 3 AND 4 AND 5
Limit to 1990-..
Limit to peer review OR dissertations

Appendix B.

Study protocol.

Working title review: Effective characteristics and training components of social skills training programs for children and adolescents: a multilevel meta-analysis.

Anticipated starting date: 09-2016

Expected completion date: 31-12-2018

Funding sources/sponsors: ZonMw "Effectief werken in de Jeugdsector", project 729300011

Conflicts of interest: None.

Review question: How are different training components of social skills training programs for children and adolescents related to program effects?

Searches: All published articles in English retrieved from major databases: PsycINFO, MEDLINE, Scopus, ERIC and Google Scholar.

Search strategy: see Appendix A.

Participants/population: Children and adolescents up to 18 years old from a general population. Special populations (e.g., children with ASD or ADHD) are excluded.

Interventions(s), exposure(s): Structured programs aimed at improving any or all types of social skills directly.

Comparator(s)/control: Comparison conditions included "care as usual", "no treatment" or "attention control".

Types of study to be included: Randomized controlled trials and quasi-experimental studies with a comparison group.

Context: Social skills (e.g., SSIS, SDQ).

Additional outcomes: All other outcomes, such as social anxiety (e.g., RMACS, SCAS), bullying behavior and academic outcomes.

Data extraction: The titles and abstracts will be retrieved using the search strategy and screened by the first and second authors. The full text of potentially eligible studies will be retrieved and assessed by the first author. Any doubt over eligibility will be discussed with the second author. Authors of eligible studies will be contacted to retrieve the manuals

of the programs under review. Data extracted from the studies will include study setting, study population, participant demographics, details of the training and control condition, recruitment information and all outcomes and times of measurement. A second reviewer will extract data independently for 15% of the studies and discrepancies will be discussed. Data extracted from the program manuals will include the aim and duration of individual exercises and overall treatment information, such as the target population, the setting and trainer characteristics.

Risk of bias (quality) assessment: The quality of studies will be assessed using Quality Assessment Tool For Quantitative Studies (Effective Public Health Practice Project, 1998), which includes assessment of the study design, treatment allocation methods, description of confounders, blinding, data collection methods and withdrawals and drop-outs.

Strategy for data synthesis: A quantitative synthesis of the aggregate findings from the included studies will be used.

Analysis of subgroups or subsets: Subgroups of outcomes (based on the main target of the program) will be assessed.

Language: English.

The country in which review is being carried out: The Netherlands

Keywords: Meta-analysis; Social skills; Training components; Children; Adolescents; Social-emotional development.

Appendix C.

Articles included in the meta-analysis.

Note. Articles indicated with an asterisk (*) were included in the main analyses of SST program effects on interpersonal and emotional skills.

*Arda, T. B., & Ocak, Ş. (2012). Social competence and Promoting Alternative Thinking Strategies PATHS preschool curriculum. *Educational Sciences: Theory and Practice*, *12*(4), 2691–2698.

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Appendix D.

Studies and social skills training programs included in the analyses.

Table D.1. *Social Skills Training Programs and Corresponding Studies Included in the Meta-analysis, Including Study Characteristics.*

Program type	Program	Author(s) (year)	Study location	Design	No. Exp.	No. Ctrl.	Outcome domains
SEL programs	4Rs Program (Reading, Writing, Respect, and Resolution)	Jones et al. (2010)	North America	RCT	515	427	IS, INT, EX
		Jones et al. (2011)	North America	RCT	630	554	IS, INT, EX
	Check, Connect, Expect	Cheney et al. (2009)	North America	RCT	73	86	IS, INT, EX
	Giant Leap	Correia & Marques Pinto (2016)	Western Europe	QE	79	84	IS, ES, PP
	Coping Power	Muratori et al. (2016)	Western Europe	RCT	100	62	IS, PP, INT, EX
		Mushtaq et al. (2016)	Asia	RCT	52	61	IS, EX
		Peterson et al. (2009)	North America	RCT	63	56	IS, INT, EX
	Going for Goals	Humphrey et al. (2010)	Western Europe	QE	102	80	IS, ES, PP, INT, EX
	TIGER Training	Vliek et al. (2014)	Western Europe	QE	185	39	PP, INT, EX
	New Beginnings	Humphrey et al. (2010)	Western Europe	QE	45	17	ES, IS, PP, INT, EX
	Promoting Alternative Thinking Skills (PATHS)	Arda & Ocak (2012)	Eastern Europe	RCT	51	44	IS, ES, INT, EX
		V. Berry et al. (2016)	Western Europe	RCT	2203	1801	IS, ES, PP, INT, EX
		Goossens et al. (2012)	Western Europe	QE	674	631	IS, ES, PP, INT, EX
		Humprey et al. (2016)	Western Europe	RCT	2423	2075	IS, ES, PP, INT, EX
		Malti et al. (2011)	Western Europe	RCT	357	342	IS, EX
		Novak et al. (2016)	Eastern Europe	RCT	280	288	IS, ES, PP, INT, EX
		Shek et al. (2008)	Asia	RCT	3792	4044	INT
	Raising Healthy Children (The Get Alongs)	Catalano et al. (2003)	North America	RCT	497	441	IS, EX
	RULER	Brackett et al. (2012)	North America	RCT	155	118	IS, INT, EX
	Second Step	Espelage et al. (2013)	North America	RCT	1940	1676	PP, EX
		Frey et al. (2005)	North America	RCT	620	615	IS, INT, EX
		Hart et al. (2009)	North America	QE	23	42	IS
		Holsen et al. (2008)	Western Europe	QE	NS	NS	IS, INT, EX
		Low et al. (2015)	North America	RCT	3583	3496	IS, ES, PP, INT, EX

Program type	Program	Author(s) (year)	Study location	Design	No. Exp.	No. Ctrl.	Outcome domains
		Taub (2002)	North America	RCT	54	33	IS, EX
		Van Schoiack-Edstrom et al. (2002)	North America	QE	NS	NS	PP, EX
	Skills for Life	Fekkes et al. (2016)	Western Europe	RCT	1107	481	PP, EX
		Gravenstijn et al. (2004)	Western Europe	QE	311	437	IS, ES
		Rahmati et al. (2010)	Middle East	RCT	20	20	IS, PP
	Slowly but Steadily	Raimundo et al. (2013)	Western Europe	QE	213	105	IS, PP
	S.S.GRIN	DeRosier (2004)	North America	RCT	187	194	IS, ES, PP, INT, EX
		Harrell et al. (2009)	North America	RCT	40	34	ES, INT, EX
		Sanchez et al. (2017)	North America	RCT	33	36	ES, PP, INT
	Strong Kids	Graves et al. (2016)	North America	RCT	31	30	IS, ES, EX
		Grossman et al. (1997)	North America	RCT	372	314	IS, ES, EX
		Kramer et al. (2014)	North America	QE	348	266	IS, INT
	Strong Teens	Castro-Olivo (2014)	North America	QE	49	53	ES, INT
	Together at School	Kiviruusu et al. (2016)	Western Europe	RCT	2036	1668	IS, ES
	We Have Skills	Marquez et al. (2014)	Eastern Europe	QE	314	104	IS
	Zippy's Friends	Clarke et al. (2014)	Western Europe	RCT	267	212	IS, ES, PP, INT, EX
		Mishara & Ystgaard (2006)	Eastern Europe	QE	314	104	IS, ES, EX
		Monkeciene et al. (2006)	Eastern Europe	QE	140	106	ES, PP, EX
Anti-bullying programs	Anger Coping Training	Avci & Kelleci (2016)	Eastern Europe	RCT	30	30	INT, EX
		Fung (2008)	Asia	RCT	12	6	IS
	Confident Kids	K. Berry & Hunt (2009)	Western Europe	RCT	2203	1801	ES, PP, INT
	Fair Play for Kids	Gibbons et al. (1995)	North America	RCT	146	140	IS, ES
		Hassandra et al. (2007)	Western Europe	RCT	60	60	IS, ES
	Promoting Positive Peer Relationships (P3R)	Renshaw & Jimerson (2011)	North America	QE	320	316	PP
	Peace Education	Kabasakal et al. (2015)	Eastern Europe	QE	46	48	IS, EX
		Sagkal et al. (2012)	Eastern Europe	QE	158	123	ES
	Preventing Relational Aggression In Schools Everyday (PRAISE)	Leff et al. (2010)	North America	RCT	NS	NS	IS, PP, EX

Program type	Program	Author(s) (year)	Study location	Design	No. Exp.	No. Ctrl.	Outcome domains
Programs that target (social) anxiety	Cognitive bias modification training	Sportel et al. (2013)	Western Europe	RCT	86	70	INT
	Cool Kids	Mifsud & Rapee (2004)	Australia	RCT	50	41	ES, INT, EX
	Cool Teens	Rapee et al. (2012)	Australia	RCT	24	19	INT
		Wutrich et al. (2012)	Australia	RCT	24	19	INT
	Intervention for test anxiety	Yeo et al. (2016)	Asia	QE	58	57	INT
	Music Performance Enhancement Program	Osborne et al. (2007)	Australia	RCT	14	9	INT
	Test anxiety intervention	Weems et al. (2015)	North America	RCT	203	165	INT
	Social Effectiveness Therapy for Children (SET-C)	Beidel et al. (2000)	North America	RCT	30	20	INT
		Öst et al. (2015)	Western Europe	RCT	32	23	INT, EX
	SHY program	Donovan et al. (2015)	Australia	QE	21	19	IS, INT
	Skills for Academic and Social Success	Masia-Warner et al. (2007)	North America	RCT	19	17	INT
	Solution Focused Approach Training	Kvarme et al. (2010)	Western Europe	QE	91	65	ES
Programs that target disruptive behavior	Aggression Replacement Training	Koposov et al. (2014)	Eastern Europe	RCT	145	90	IS, EX
	Friend2Friend	Leff et al. (2015)	North America	RCT	73	71	IS, PP, EX
	Group Mentoring program	Jent & Niec (2009)	North America	RCT	45	41	IS, INT, EX
	Individual Social Skills Training	Kjøbli & Ogden (2014)	Western Europe	RCT	99	99	IS, INT, EX
	Learning How To Deal With Angry Feelings	Cole et al. (2013)	Western Europe	RCT	35	35	IS, ES, PP, INT, EX
	Social Problem solving Training Program	Seçer & Ogelman (2011)	Eastern Europe	RCT	15	15	EX
	Student Created Aggression Regulation Education Program (SCARE)	Bundy et al. (2011)	North America	RCT	20	17	IS, EX
	SMART Talk	Bosworth et al. (2000)	North America	RCT	321	195	ES, EX
	Stop Now And Plan (SNAP)	Burke & Loeber (2015)	North America	RCT	130	122	INT, EX
	Social Cognitive Intervention Program	van Manen et al. (2004)	Western Europe	RCT	42	15	IS, ES, INT, EX
		Muris et al. (2005)	Western Europe	QE	31	11	IS, EX
	Self-management Training And Regulation Strategy (STARS)	Thompson (2014)	North America	RCT	60	48	IS, EX

Program type	Program	Author(s) (year)	Study location	Design	No. Exp.	No. Ctrl.	Outcome domains
Programs that target resilience and self-esteem	Aussie Optimism program	Roberts et al. (2010)	Australia	RCT	237	191	IS, ES, INT, EX
	Fun FRIENDS	Essau et al. (2012)	Western Europe	RCT	302	336	IS, INT
		Lock & Barrett (2003)	Australia	RCT	442	295	IS, INT
		Lowry-Webster et al. (2003)	Australia	RCT	432	162	INT
		Matsumoto et al. (2016)	Asia	QE	93	59	INT
		Miller et al. (2011)	North America	RCT	65	126	INT
	Girls First	Leventhal et al. (2015)	India	RCT	1832	900	ES, INT
	Girls on the Go!	Tirlea et al. (2016)	Australia	RCT	NS	NS	ES
	Resourceful Adolescent Program (RAP)	Rose et al. (2014)	Australia	RCT	104	165	IS, INT
Programs that target prosocial interactions	Circle Time	Cefai et al. (2014)	Western Europe	QE	37	37	IS, PP, INT, EX
	Dinosaur Program Incredible Years	Hutchings et al. (2011)	Western Europe	QE	12	12	IS
		Webster-Stratton et al. (2004)	North America	RCT	30	26	IS, EX
	Mate Tricks	O'Hare et al. (2015)	Western Europe	RCT	304	285	IS, ES, PP, EX
	Open Circle	Hennesey (2007)	North America	QE	66	81	IS, EX
	PALS	Ogden et al. (2007)	Western Europe	QE	37	12	IS, ES, INT, EX
		Sørlie & Ogden (2007)	Western Europe	QE	363	372	IS
		Sørlie & Ogden (2015)	Western Europe	QE	3285	2094	IS, EX
	PMIP	Romersi et al. (2011)	Western Europe	QE	128	70	IS
	SPRinG the Water Game	Kutnick (1997)	Western Europe	QE	30	30	IS
	STER camp	van Vugt et al. (2012)	Western Europe	QE	86	75	ES, PP, INT, EX
	Tools for Getting Along	Daunic et al. (2006)	North America	RCT	38	27	IS, ES, EX
		Daunic et al. (2012)	North America	RCT	708	579	IS, ES, EX
		Smith et al. (2014)	North America	RCT	362	347	IS, ES, INT, EX

Note. RCT = randomized controlled trial, QE = quasi-experimental, No. Exp. = number of participants in the experimental group,
No. Ctrl. = number of participants in the control group, NS = not specified, IS = Interpersonal skills, ES = Emotion skills, PP = Peer problems, INT = Internalizing problem behavior, EX = Externalizing problem behavior.

Table D.2. *Training Components of the Featured Social Skills Training Programs.*

Program	Category of the training component																							
	Psycho education		Psycho-physical components				Skill-building components					Cognitive-emotional components						Booster components						
	Knowledge about behavior	Knowledge about interpersonal processes	Relaxation	Posture	Self-confidence	Trusting others	Interpersonal verbal and non-verbal communication	Teamwork	Prosocial behavior	Problem-solving	Exposure	Self-awareness	Recognition of emotions (self)	Recognition of emotions (others)	Self-regulation	Cognitive restructuring	Mindfulness	Class management	Rewards	Behavior contracting	Generalization	Coaching	(Self-)monitoring
Social-emotional learning (SEL) programs																								
4Rs program	•		•	•			•	•	•	•		•	•	•	•			•			•	•	•
Check, Connect, Expect							•		•	•		•							•	•		•	•
Coping Power Program	•		•				•		•	•		•	•	•	•	•		•	•	•	•	•	•
Giant Leap	•	•				•	•	•	•	•		•	•	•				•		•			•
Going for Goals			•					•	•			•				•		•		•	•	•	
TIGER (Topper) training	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•		•	•			•	•
New Beginnings			•				•	•				•						•	•	•	•	•	
Promoting Alternative Thinking Strategies (PATHS)	•	•							•	•		•	•	•				•			•	•	
Raising Healthy Children (The Get Alongs)	•		•				•	•	•	•		•	•	•	•			•			•		•
RULER	•	•											•	•	•			•			•	•	
Second Step – Grade 4	•		•				•		•	•			•	•	•	•					•		
Second Step – Grade 5	•		•				•		•	•			•	•	•	•					•		
Second Step – Grade 6	•		•				•		•	•		•	•	•	•	•		•					
Second Step – Grade 7	•								•	•		•	•	•	•	•		•					
Skills for Life	•	•				•	•	•	•	•		•	•	•		•		•			•	•	
Slowly but Steadily	•	•	•						•	•		•	•	•	•			•			•	•	
Social Skills Group Intervention (S.S.GRIN)							•	•	•	•		•	•	•	•			•	•	•		•	
Strong Kids	•									•		•	•	•	•	•		•			•	•	
Strong Teens	•	•	•							•		•	•	•	•	•		•		•	•	•	•
Together at School	•									•		•	•	•	•			•				•	
We Have Skills	•		•				•		•			•						•			•	•	
Zippy's Friends	•		•				•		•	•			•	•				•	•			•	

Program	Category of the training component																						
	Psycho education		Psycho-physical components				Skill-building components						Cognitive-emotional components					Booster components					
	Knowledge about behavior	Knowledge about interpersonal processes	Relaxation	Posture	Self-confidence	Trusting others	Interpersonal verbal and non-verbal communication	Teamwork	Prosocial behavior	Problem-solving	Exposure	Self-awareness	Recognition of emotions (self)	Recognition of emotions (others)	Self-regulation	Cognitive restructuring	Mindfulness	Class management	Rewards	Behavior contracting	Generalization	Coaching	(Self-)monitoring
Anti-bullying programs																							
Anger Coping Training	•	•					•	•	•	•		•	•	•	•	•		•	•	•	•	•	
Confident Kids program	•	•		•			•			•	•	•				•		•	•		•	•	
Fair Play for Kids	•	•						•	•					•				•			•		
Promoting Positive Peer Relationships (P3R)	•	•																•					
Peace Education	•		•				•		•	•		•		•	•			•	•		•	•	
Preventing Relational Aggression In Schools Everyday (PRAISE)	•	•							•	•			•	•	•			•			•	•	
Programs that target (social) anxiety																							
Anxiety CBT	•	•	•								•	•				•		•			•	•	
Anxiety program	•		•								•	•			•	•		•	•		•	•	
Cool Kids	•	•					•			•	•	•		•		•		•	•		•	•	
Music Performance Enhancement Program	•		•									•					•			•			
Cognitive bias modification training	•	•									•	•				•		•			•	•	
Social Effectiveness Training for children (SET-C)	•	•					•		•									•			•	•	
SHY program	•		•				•	•		•	•					•		•	•		•	•	
Skills for Academic and Social Success (SASS)	•						•				•							•			•	•	
Solution Focused Approach training	•									•		•						•	•				•
Programs that target disruptive behavior																							
Aggression Replacement Training (ART)	•						•		•	•		•	•	•	•			•			•	•	

Program	Category of the training component																					
	Psycho education		Psycho-physical components				Skill-building components					Cognitive-emotional components						Booster components				
	Knowledge about behavior	Knowledge about interpersonal processes	Relaxation	Posture	Self-confidence	Trusting others	Interpersonal verbal and non-verbal communication	Teamwork	Prosocial behavior	Problem-solving	Exposure	Self-awareness	Recognition of emotions (self)	Recognition of emotions (others)	Self-regulation	Cognitive restructuring	Mindfulness	Class management	Rewards	Behavior contracting	Generalization	Coaching	(Self-)monitoring
Friend2Friend	•								•	•			•	•	•			•	•	•	•	•	
Group Mentoring program	•	•	•	•			•	•	•	•			•	•	•			•	•		•	•	•
Individual Social Skills Training	•						•			•					•			•	•		•	•	
Learning How To Deal With Angry Feelings	•											•	•	•	•	•		•				•	•
Social Problem solving Training Program	•		•				•		•	•			•	•		•		•	•		•	•	•
Student Created Aggression Regulation Education Program (SCARE)	•	•	•				•		•	•		•	•		•			•			•	•	
Students Managing Anger Resolution Together (SMART Talk)										•		•			•								
Stop Now And Plan (SNAP)	•							•	•	•		•	•		•	•	•		•	•	•	•	•
Social Cognitive Intervention Program	•	•				•	•	•	•	•		•		•	•			•			•	•	
Self-management Training And Regulation Strategy (STARS)			•					•		•		•		•		•							•
Programs that target resilience and self-esteem																							
Aussie Optimism program												•	•	•		•		•			•	•	
Fun FRIENDS	•	•	•				•		•	•		•		•		•		•	•		•	•	
Girls First																							
Girls on the Go!	•		•	•	•		•	•	•			•		•				•	•	•	•		
Resourceful Adolescent Program	•		•				•			•		•	•		•	•		•					•

Program	Category of the training component																					
	Psycho education		Psycho-physical components				Skill-building components					Cognitive-emotional components						Booster components				
	Knowledge about behavior	Knowledge about interpersonal processes	Relaxation	Posture	Self-confidence	Trusting others	Interpersonal verbal and non-verbal communication	Teamwork	Prosocial behavior	Problem-solving	Exposure	Self-awareness	Recognition of emotions (self)	Recognition of emotions (others)	Self-regulation	Cognitive restructuring	Mindfulness	Class management	Rewards	Behavior contracting	Generalization	Coaching	(Self-)monitoring
Programs that target prosocial interactions																						
Circle Time	•	•	•						•	•		•	•	•	•			•	•				
Dinosaur Program Incredible Years	•		•				•	•	•	•		•	•	•	•			•					
Mate Tricks			•				•	•	•	•		•	•	•	•	•		•	•	•	•	•	
Open Circle	•	•	•				•	•	•	•			•		•	•		•			•	•	
PALS program							•	•	•	•			•	•	•			•				•	•
Programa Minimo de Incremento Prosocial (PMIP)	•								•	•								•			•	•	•
Star camp	•		•				•	•	•	•			•	•	•	•		•	•	•		•	
The Water Game	•					•	•	•		•		•						•			•	•	
Tools for Getting Along	•	•								•		•	•	•	•			•				•	

Appendix E.

Moderator analyses of research design characteristics.

Table E.1. *Results of Moderator Analyses of Research Design Characteristics For the Effect of SST Programs on Interpersonal and Emotional Skills Using a Three-way univariate model.*

Moderator	Category	*# p*	*# k*	*# ES*	Estimate	95% CI	Q	*p*
Quality of the study	Weak	13	14	92	.534***	.375 - .692	*F* (2, 366) = 9.243	< .001
	Moderate	30	36	138	.455***	.348 - .563		
	Strong	19	27	139	.167**	.051 - .282		
Sample size		50	77	369	.431***	.346 - .516	*F* (1, 367) = 9.464	.002
Time between pretest and first reported post-test	< 6 months	39	63	196	.400***	.297 - .504	*F* (3, 361) = 1.397	.243
	7 – 12 months	16	22	101	.363***	.224 - .503		
	13 months – 2 years	7	9	54	.234*	.031 - .437		
	> 2 years	3	3	14	.063	-.337 - .463		
Type of informant	Self-report	37	48	155	.381***	.286 - .475	*F* (2, 354) = .886	.413
	Behavior rating (others)	32	45	192	.333***	.242 - .424		
	Behavioral observation	4	5	19	.264**	.067 - .460		

Note. # p = number of SST programs; *# k* = number of studies; *# ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix F.

Analyses performed with peer relationship problem outcomes.

Table F.1. *Results of Moderator Analyses Using a Three-way Univariate Model with Peer Relationship Problems Outcomes Only.*

Moderator	Category	# *p*	# *k*	# *ES*	Estimate	95% CI	Q	*p*
Psychoeducation	Not included in the program	4	5	15	.170	-.163 - .503	*F* (1, 54) = .348	.558
	Included in program	15	22	41	.282**	.097 - .468		
Psychophysical components	Not included in the program	7	12	23	.172	-.068 - .413	*F* (1, 54) = .850	.361
	Included in program	12	15	33	.321**	.106 - .536		
Skill-building components	Not included in the program	2	2	3	.286	-.364 - .936	*F* (1, 54) = .009	.924
	Included in program	17	25	53	.254**	.086 - .422		
Cognitive-emotional components	Not included in the program	1	1	2	-	-	-	-
	Included in program	18	26	54	-	-		

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix G.

Analyses performed with internalizing behavior problem outcomes.

Table G.1. *Results of Moderator Analyses Using a Three-way Univariate Model with Internalizing Problem Behavior Outcomes Only.*

Moderator	Category	# *p*	# *k*	# *ES*	Estimate	95% CI	Q	*p*
Psychoeducation	Not included in the program	6	8	18	.199*	.013 - .384	*F* (1, 180) = .158	.691
	Included in program	29	44	164	.239***	.159 - .320		
Psychophysical components	Not included in the program	17	26	97	.244***	.138 - .350	*F* (1, 180) = .080	.778
	Included in program	18	26	85	.223***	.119 - .326		
Skill-building components	Not included in the program	4	4	8	.017	-.281 - .315	*F* (1, 180) = 2.162	.143
	Included in program	31	48	174	.246***	.171 - .321		
Cognitive-emotional components	Not included in the program	1	2	25	-	-	-	-
	Included in program	34	50	157	-	-		

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix H.

Analyses performed with externalizing behavior problem outcomes.

Table H.1. *Results of Moderator Analyses Using a Three-way Univariate Model with Externalizing Problem Behavior Outcomes Only.*

Moderator	Category	# *p*	# *k*	# *ES*	Estimate	95% CI	Q	*p*
Psychoeducation	Not included in the program	9	11	44	.099	-.116 - .315	*F* (1, 230) = .548	.460
	Included in program	30	49	188	.189***	.085 - .294		
Psychophysical components	Not included in the program	18	31	133	.214**	.083 - .346	*F* (1, 230) = .825	.365
	Included in program	21	29	99	.128	-.006 - .262		
Skill-building components	Not included in the program	3	3	6	.243	-.215 - .700	*F* (1, 230) = .097	.756
	Included in program	36	57	226	.169***	.073 - .265		
Cognitive-emotional components	Not included in the program	1	1	1	-	-	-	-
	Included in program	38	59	231	-	-		

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Estimate = estimate of effect size; CI = confidence interval; Q = Q-test of heterogeneity.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix I.

The overall estimated effects of subgroups of SST programs on the different outcome domains.

Table I.1. *Effects of Subgroups of Social Skills Training Programs on the Different Outcome Domains.*

Outcome domains by type of SST program	# *p*	# *k*	# *ES*	Mean *d*	95% CI	*p*	$\sigma^2_{level\ 2}$	$\sigma^2_{level\ 3}$
SEL programs								
Interpersonal skills	18	36	144	.290	.187 - .393	< .001	.008***	.093***
Emotional skills	11	20	77	.249	.142 - .355	< .001	.014***	.048***
Peer relationship problems	11	19	40	.171	.000 -.342	.050	.069***	.091**
Internalizing behavior problems	12	24	44	.128	.065 - .191	< .001	.002**	.014***
Externalizing behavior problems	14	31	123	.095	-.007 - .197	.067	.016***	.077***
Programs targeting (social) anxiety								
Interpersonal skills	1	1	4	.259	-.248 - .766	.203	.000	.033
Emotional skills	2	2	10	.264	.082 - .446	.010	.000	.003
Peer relationship problems	0	0	0	-	-	-	-	-
Internalizing behavior problems	8	10	74	.384	.134 - .634	.003	.221***	.107**
Externalizing behavior problems	2	2	2	.420	-1.852 - 2.692	.256	.000	.000
Anti-bullying programs								
Interpersonal skills	4	7	20	.709	.367 - 1.050	< .001	.124***	.131
Emotional skills	3	4	9	.864	.742 - .987	< .001	.007	.000
Peer relationship problems	3	3	10	.666	-.010 - 1.342	.053	.059	.350*
Internalizing behavior problems	2	2	7	.846	.583 - 1.110	< .001	.000	.000
Externalizing behavior problems	3	3	22	.774	.099 - 1.448	.027	.000	.500***
Programs targeting disruptive behavior								
Interpersonal skills	8	9	27	.253	.127 - .378	< .001	.041	.000
Emotional skills	3	3	5	.494	-.316 - 1.304	.166	.005	.213
Peer relationship problems	2	2	3	.219	-.740 - 1.179	.429	.000	.066
Internalizing behavior problems	5	5	11	.348	.092 - .603	.013	.000	.040
Externalizing behavior problems	11	12	39	.245	.086 - .405	.004	.011*	.051**
Programs targeting resilience and self-esteem								
Interpersonal skills	3	4	14	-.006	-.094 - .083	.893	.016***	.000
Emotional skills	3	3	13	.287	.015 - .559	.040	.003	.054**
Peer relationship problems	0	0	0	-	-	-	-	-
Internalizing behavior problems	4	8	41	.112	.046 - .178	.001	.030***	.000
Externalizing behavior problems	2	2	2	.165	-.795 - 1.125	.273	.000	.000
Programs targeting prosocial interactions								

Outcome domains by type of SST program	# *p*	# *k*	# *ES*	Mean *d*	95% CI	*p*	$\sigma^2_{level\ 2}$	$\sigma^2_{level\ 3}$
Interpersonal skills	8	13	30	.660	.273 - 1.048	.002	.329***	.274
Emotional skills	4	6	16	.098	-.088 - .284	.281	.000	.037**
Peer relationship problems	3	3	3	.149	-.373 - .670	.344	.011	.011
Internalizing behavior problems	4	4	5	.198	.028 - .369	.032	.000	.000
Externalizing behavior problems	4	10	44	.045	-.145 - .235	.638	.043***	.069**

Note. # *p* = number of SST programs; # *k* = number of studies; # *ES* = number of effect sizes; Mean *d* = mean effect size (*d*); 95% CI = confidence interval; $\sigma^2_{level\ 2}$ = variance within studies; $\sigma^2_{level\ 3}$ = variance between studies; % Var. = percentage of variance explained at level.

* $p < .05$, ** $p < .01$, *** $p < .001$.

APPENDICES CHAPTER 3

Appendix A.

Information about the implemented intervention modules.

Table A.1. *Session Overview of the Implemented Modules.*

Session	Exposure module	Cognitive restructuring module	Combination module
1.	• Introduce yourself (step one of starting and joining a conversation). • Establish group rules • Education about and normalization of anxiety • Introduction of the "anxiety thermometer". • Explanation of how avoidance leads to the maintenance of anxiety. • First step on the stepladder of asking and answering a question. • First step of the stepladder of giving a presentation. • Closure of the session.	• Introduce yourself. • Establish group rules. • Education about and normalization of anxiety. • Introduction of the Thoughts-Feelings-Behavior-model using a story, connection between thoughts and feelings. • Practice with the Thoughts-Feelings-Behavior-model. • Closure of the session.	• Introduce yourself (step one of starting and joining a conversation). • Establish group rules. • Education about and normalization of anxiety. • Introduction of the "anxiety thermometer". • Explanation of how avoidance leads to the maintenance of anxiety. • Explain two strategies to decrease anxiety: change thoughts (cognitive restructuring) and face the situation (exposure). • First step of the stepladder of giving a presentation. • Closure of the session.
2.	• Introduction of the session. • Short game to practice with stepladder. • Second step of asking and answering a question. • Second step of starting and joining a conversation. • Second step of giving a presentation. • Closure of the session.	• Introduction of the session. • Introduction on the "anxiety thermometer". • Practice identifying helpful and non-helpful thoughts. • Practice transforming non-helpful thoughts into positive thoughts. • Use Thoughts-Feelings-Behavior-model on hypothetical situation asking and answering a question and starting and joining a conversation. • Closure of the session.	• Introduction of the session. • Short game to practice with stepladder. • Introduction of the Thoughts-Feelings-Behavior-model using a story, connection between thoughts and feelings. • Practice with the Thoughts-Feelings-Behavior-model with situation the first step of giving a presentation. • Further explanation about Thoughts-Feelings-Behavior-model: connection between thoughts, feelings and behavior. • Second step of the stepladder of starting and joining a conversation. • Closure of the session.

Session	Exposure module	Cognitive restructuring module	Combination module
3.	• Introduction of the session. • Practice making a stepladder for making a new friend. • Third step of asking and answering a question. • Third step of giving a presentation. • Closure of the session.	• Introduction to the session. • Further explanation about Thoughts-Feelings-Behavior-model: connection between thoughts, feelings and behavior. • Practice with Thoughts-Feelings-Behavior-model for two situations: answering a question and joining an on-going conversation. • Closure of the session.	• Introduction to the session. • Practice identifying helpful and non-helpful thoughts. • Practice transforming non-helpful thoughts into positive thoughts with third step of starting and joining a conversation. • Second step of giving a presentation. • Closure of the session.
4.	• Introduction of the session. • Step four of giving a presentation. • Review of all sessions. • Closure of the module with a certificate.	• Introduction of the session. • Short game to recap transforming non-helpful thoughts to helpful thoughts. • Use Thoughts-Feelings-Behavior-model for giving a presentation. • Review of all sessions. • Closure of the module with a certificate.	• Introduction of the session. • Practice with Thoughts-Feelings-Behavior-model for third step of giving a presentation. • Step four of giving a presentation. • Review of all sessions. • Closure of module with a certificate.

Table A.2. *Social Situations Broken Down Into Steps.*

Situation	Steps
Asking and answering a question	1. asking and answering premade, simple questions (such as "What is your name? How many siblings do you have?") in pairs; 2. asking and answering a self-conceived question in the group and; 3. asking and answering a self-conceived question in the group and asking follow-up questions.
Starting and joining a conversation	4. introducing yourself to your peers; 5. starting a conversation with two peers and; 6. joining an on-going conversation.
Giving a presentation	7. talking about a familiar subject (e.g. their pet, hobby or bedroom) for half a minute whilst sitting down in a circle; 8. talking about your family or weekend for one minute, whilst standing firmly in front of their chair and making eye contact with peers; 9. talking about your last holiday for two minutes, whilst standing firmly in front of their chair and making eye contact with peers and; 10. standing in front of the group and talking about your favorite movie for three minutes

Table A.3. *Steps Used To Restructure Negative Thoughts Into Positive Thoughts.*

Step	Instructions
1	First, children were asked to reflect on the situation ("What is happening in this situation?").
2	Next, children were asked to write down what their first thought in this situation would be ("What am I thinking?") and rate their level of anxiety.
3	Children then identified if this thought is helpful or unhelpful. To help participants transform negative thoughts into positive thoughts, children were taught two strategies.
4	The first strategy is to formulate a counter thought, which is the direct opposite of the negative thought. The second strategy is to reflect on what they would say to their best friend in this situation if they wanted to be supportive.
5	After this, the participants wrote down their positive thought and rated their level of anxiety again
6	Finally, participants were asked to reflect on how this positive thought could change their behavior.

Appendix B.

M*plus* syntax for unconstrained and constrained latent change models.

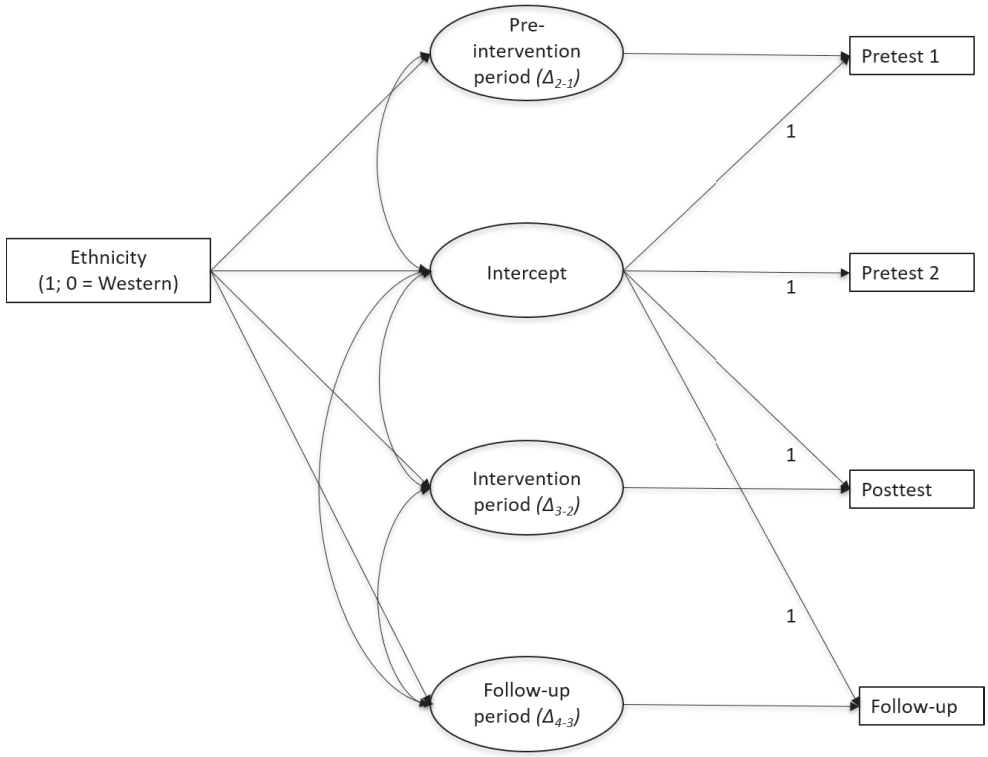
M*Plus* syntax for the unconstrained model with pretest 2 as the intercept.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);

MODEL:
intercptpre by Time1- Time4@1;
intercptpre difpre1pre2 | Time1@1 Times2@0 Time3@0 Time4@0;
intercptpre difpre2post | Time1@0 Time2@0 Time3@1 Time4@0;
intercptpre difpre2fu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time3@0;
Time4@0;
difpre1pre2 with difpre2post@0;
difpre1pre2 with difpre2fu@0;
intercptpre difpre1pre2 difpre2post difpre2fu on Ethnicity;
```

M*plus* syntax for the constrained model with posttest as the intercept used to assess the difference between condition 2 and condition 3 on the change from pretest 2 to posttest.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);

MODEL:
intercptpost by Time1- Time4@1;
intercptpost difpre1post | Time1@1 Time2@0 Time3@0 Time4@0;
intercptpost difpre2post | Time1@0 Time2@1 Time3@0 Time4@0;
intercptpost difpostfu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time2@0;
Time4@0;
difpre2post with difpostfu@0;
difpre1post with difpostfu@0;
intercptpost difpre1post difpre2post difpostfu on Ethnicity;
[difpre2post](100);
MODEL Condition2:
[difpre2post](1);
MODEL Condition3:
[difpre2post](1);
```

Figure B.1. *Latent Change Model with Pretest 2 as the Intercept and Ethnicity as the Covariate.*



Appendix C.

Correlation matrices.

Table C.1. *Correlations Between Outcomes at Pretest 1 (Above the Diagonal) and Pretest 2 (Below the Diagonal).*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Social anxiety	-	.525**	.339**	.321**	-.203**	-.207**	.660**	.577**	-.300**	-.093	-.335**
2. Anxious behaviour	.646**	-	.528**	.442**	-499**	-.435*	.541**	.420**	-.531**	-.256**	-.354**
3. Distress	.598**	.709**	-	.439**	-.560**	-.328**	.335**	.351**	-.557**	-.240**	-.212**
4. Avoidant behaviour	.428**	.550**	.600**	-	-.441**	-.314**	.289**	.315**	-.469**	-.284**	-.345**
5. Approach behaviour	-.391**	-.590**	-.696**	-.622**	-	.462**	-.257**	-.308**	.693**	.429**	.316**
6. Positive thoughts	-.502**	-.564**	-.619**	-.539**	.611**	-	-.282**	-.257**	.672**	.482**	.547**
7. Negative thoughts	.605**	.612**	.509**	.424**	-.342**	-.485**	-	.569**	-.559**	-.108*	-.517**
8. Internalizing behaviour	.509**	.519**	.409**	.495**	-.350**	-.470**	.625**	-	-.513**	-.184*	-.530**
9. Self-efficacy	-.537**	-.692**	-.769**	-.647**	.789**	.543**	-.324**	-.386**	-	.561**	.469**
10. Social skills	-.281**	-.257**	-.305**	-.245**	.433**	.499**	-.245**	-.262**	.464**	-	.577**
11. Self-perceived competence	-.473**	-.411**	-.433**	-.518**	.430**	.609**	-.578**	-.633**	.554**	.516**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Table C.2. *Correlations Between Outcomes at Posttest (Above the Diagonal) and Follow-up (Below the Diagonal).*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Social anxiety	-	.717**	.672**	.554**	-.633**	-.487**	.675**	.504**	-.657**	-.279**	-.547**
2. Anxious behaviour	.719**	-	.729**	.600**	-.601**	-.487**	.610**	.540**	-648**	-.175**	-.454**
3. Distress	.684**	.724**	-	.616**	-.768**	-.480**	.441**	.381**	-.773**	-.181*	-.346**
4. Avoidant behaviour	.519**	.581**	.542**	-	-.636**	-.429**	.456**	.423**	-.586**	-.353**	-.480**
5. Approach behaviour	-.574**	-.594**	-.686**	-.641**	-	.568**	-.367**	-.305**	.743**	.341**	.362**
6. Positive thoughts	-.498**	-.505**	-.415**	-.489**	.439**	-	-.430**	-.382**	.505**	.500**	.542**
7. Negative thoughts	.708**	.631**	.463**	.534**	-.388**	-.474**	-	589**	-.441**	-.233**	-.613**
8. Internalizing behaviour	.461**	.451**	.376**	.581**	-.359**	-.481**	.580**	-	-.373**	-.138	-.601**
9. Self-efficacy	-.567**	-.655**	-.710**	-.613**	.694**	.586**	-.547**	-.436**	-	.333**	.489**
10. Social skills	-.239**	-.098	-.109	-.383**	.317**	.490**	-.324**	-.233**	.235**	-	.524**
11. Self-perceived competence	-.398**	-.290**	-.297**	-.405**	.359**	.607**	-.534**	-.543**	.393**	.564**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Appendix D.

Fit statistics for the evaluated models.

Table D.1. *Model Fit Statistics for the Unconstrained Latent Change Models.*

Outcome	χ^2	*df*	*p*	RMSEA	95%-CI	CFI
Social anxiety	1.41	3	.70	.00	.00 - .15	1.00
Anxious behavior	1.40	3	.70	.00	.00 - .16	1.00
Distress	.06	1	.81	.00	.00 - .21	1.00
Avoidant behavior	2.86	3	.41	.00	.00 - .21	1.00
Approach behavior	1.99	3	.57	.00	.00 - .18	1.00
Positive thoughts	2.87	3	.41	.00	.00 - .21	1.00
Perceived social threat	1.40	3	.71	.00	.00 - .16	1.00
Internalizing behaviour	2.22	3	.53	.00	.00 - .19	1.00
Self-efficacy	2.82	3	.42	.00	.00 - .21	1.00
Social skills	1.51	3	.68	.00	.00 - .16	1.00
Self-perceived competence	7.65	6	.26	.07	.00 - .19	.99

Note. Pretest 2 is the intercept in the unconstrained models; RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table D.2. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Within Conditions.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Social anxiety	Unconstrained model	1.41	3	.70	.00	.00 - .15	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	18.66	4	.00	.24	.14 - .36	.94	17.25***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	38.42	4	.00	.36	.27 - .48	.87	37.01***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	2.59	4	.63	.00	.00 - .15	1.00	1.18
Anxious behavior	Unconstrained model	1.40	3	.70	.00	.00 - .16	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	5.73	4	.22	.08	.00 - .22	.99	4.33*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	28.68	4	.00	.31	.21 - .42	.91	27.28***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	3.24	4	.52	.00	.00 - .17	1.00	1.84
Distress	Unconstrained model	.06	1	.81	.00	.00 - .21	1.00	.06
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	8.90	1	.003	.35	.17 - .58	.97	8.84**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	16.81	1	.00	.50	.31 - .72	.94	16.75***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	6.10	1	.01	.28	.10 - .52	.98	6.04*
Avoidant behavior	Unconstrained model	2.86	3	.41	.00	.00 - .21	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	5.94	4	.20	.09	.00 - .22	.99	3.08
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	22.13	4	.00	.27	.16 - .38	.93	19.27***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	3.19	4	.53	.00	.00 - .17	1.00	.33
Approach behavior	Unconstrained model	1.99	3	.57	.00	.00 - .18	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	7.96	4	.09	.12	.00 - .25	.99	5.97*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	17.29	4	.002	.23	.12 - .34	1.00	15.30***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	3.24	4	.52	.00	.00 - .17	1.00	1.25
Positive thoughts	Unconstrained model	2.87	3	.41	.00	.00 - .21	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	18.08	4	.001	.23	.13 - .35	.95	15.21***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	14.19	4	.007	.20	.09 - .32	.97	11.31**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	2.90	4	.59	.00	.00 - .16	1.00	.03
Perceived social threat	Unconstrained model	1.40	3	.71	.00	.00 - .16	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	12.88	4	.01	.19	.08 - .30	.97	11.48***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	10.77	4	.03	.16	.05 - .28	.97	9.37**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	2.17	4	.70	.00	.00 - .14	1.00	.77
Internalizing behaviour	Unconstrained model	2.22	3	.53	.00	.00 - .19	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	8.47	4	.08	.13	.00 - .26	.98	6.25*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	11.79	4	.02	.17	.06 - .29	.97	9.57**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	6.77	4	.15	.11	.00 - .24	.99	4.55*
Self-efficacy	Unconstrained model	2.82	3	.42	.00	.00 - .21	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	4.91	4	.30	.06	.00 - .21	1.00	2.09
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	16.29	4	.003	.22	.12 - .34	.95	13.47***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	4.40	4	.35	.04	.00 - .20	1.00	1.58
Social skills	Unconstrained model	1.51	3	.68	.00	.00 - .16	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	15.74	4	.003	.21	.11 - .33	.97	14.23***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	6.40	4	.17	.09	.00 - .23	.99	4.89*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	1.51	4	.82	.00	.00 - .13	1.00	.00
Self-perceived competence	Unconstrained model	7.65	6	.26	.07	.00 - .19	.99	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in EX	16.04	7	.02	.14	.05 - .24	.97	8.39**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	16.82	7	.02	.15	.06 - .24	.96	9.17**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CM	9.37	7	.23	.07	.00 - .18	.99	1.72

Note. Pre-test 2 is the intercept in the unconstrained models. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; EX = Exposure condition; CR = Cognitive restructuring condition; CM = Combination condition.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table D.3. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Between Conditions.*

	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Social anxiety	Unconstrained model	1.41	3	.70	.00	.00 - .15	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	2.43	4	.66	.00	.00 - .15	1.00	1.02
	$\Delta_{3\text{-}2}$ equal in EX & CM	4.44	4	.35	.04	.00 - .20	1.00	3.03
	$\Delta_{3\text{-}2}$ equal in CR & CM	6.71	4	.15	.10	.00 - .23	.99	5.30*
	$\Delta_{4\text{-}3}$ equal in EX & CR	1.50	5	.91	.00	.00 - .07	1.00	.09 [a]
	$\Delta_{4\text{-}3}$ equal in EX & CM	1.43	5	.92	.00	.00 - .06	1.00	.02 [a]
	$\Delta_{4\text{-}3}$ equal in CR & CM	1.56	5	.91	.00	.00 - .07	1.00	.15 [a]
Anxious behavior	Unconstrained model	1.40	3	.70	.00	.00 - .16	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	1.66	4	.79	.00	.00 - .12	1.00	.26
	$\Delta_{3\text{-}2}$ equal in EX & CM	1.48	4	.83	.00	.00 - .11	1.00	.08
	$\Delta_{3\text{-}2}$ equal in CR & CM	1.84	4	.76	.00	.00 - .13	1.00	.44
	$\Delta_{4\text{-}3}$ equal in EX & CR	3.08	4	.54	.00	.00 - .17	1.00	1.68
	$\Delta_{4\text{-}3}$ equal in EX & CM	1.54	4	.82	.00	.00 - .12	1.00	.14
	$\Delta_{4\text{-}3}$ equal in CR & CM	1.78	4	.78	.00	.00 - .13	1.00	.38
Distress	Unconstrained model	.06	1	.81	.00	.00 - .21	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	.40	2	.82	.00	.00 - .15	1.00	.34
	$\Delta_{3\text{-}2}$ equal in EX & CM	.06	2	.97	.00	.00 - .00	1.00	.00
	$\Delta_{3\text{-}2}$ equal in CR & CM	.26	2	.89	.00	.00 - .12	1.00	.20
	$\Delta_{4\text{-}3}$ equal in EX & CR	3.07	2	.21	.09	.00 - .28	1.00	2.32 [b]
	$\Delta_{4\text{-}3}$ equal in EX & CM	2.38	2	.30	.05	.00 - .26	1.00	1.63 [b]
	$\Delta_{4\text{-}3}$ equal in CR & CM	.80	2	.67	.00	.00 - .19	1.00	.05 [b]
Avoidant behavior	Unconstrained model	2.86	3	.41	.00	.00 - .21	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	2.94	4	.57	.02	.00 - .16	1.00	.08
	$\Delta_{3\text{-}2}$ equal in EX & CM	3.10	4	.54	.00	.00 - .17	1.00	.24
	$\Delta_{3\text{-}2}$ equal in CR & CM	3.36	4	.50	.00	.00 - .17	1.00	.50
	$\Delta_{4\text{-}3}$ equal in EX & CR	11.94	4	.02	.18	.07 - .30	.97	9.08**
	$\Delta_{4\text{-}3}$ equal in EX & CM	3.49	4	.48	.00	.00 - .18	1.00	.63
	$\Delta_{4\text{-}3}$ equal in CR & CM	4.13	4	.39	.02	.00 - .19	1.00	1.27
Approach behavior	Unconstrained model	1.99	3	.57	.00	.00 - .18	1.00	

	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{3\text{-}2}$ equal in EX & CR	3.95	4	.41	.00	.00 - .19	1.00	1.96
	$\Delta_{3\text{-}2}$ equal in EX & CM	2.73	4	.60	.00	.00 - .16	1.00	.74
	$\Delta_{3\text{-}2}$ equal in CR & CM	2.07	4	.72	.00	.00 - .14	1.00	.08
	$\Delta_{4\text{-}3}$ equal in EX & CR	3.62	4	.46	.00	.00 - .18	1.00	1.63
	$\Delta_{4\text{-}3}$ equal in EX & CM	2.26	4	.69	.00	.00 - .14	1.00	.27
	$\Delta_{4\text{-}3}$ equal in CR & CM	2.27	4	.69	.00	.00 - .14	1.00	.28
Self-efficacy	Unconstrained model	2.82	3	.42	.00	.00 - .21	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	3.21	4	.52	.00	.00 - .17	1.00	.39
	$\Delta_{3\text{-}2}$ equal in EX & CM	3.88	4	.42	.00	.00 - .19	1.00	1.06
	$\Delta_{3\text{-}2}$ equal in CR & CM	3.05	4	.55	.00	.00 - .17	1.00	.23
	$\Delta_{4\text{-}3}$ equal in EX & CR	5.56	4	.23	.08	.00 - .22	.99	2.74
	$\Delta_{4\text{-}3}$ equal in EX & CM	3.28	4	.51	.00	.00 - .17	1.00	.46
	$\Delta_{4\text{-}3}$ equal in CR & CM	3.77	4	.44	.00	.00 - .18	1.00	.95
Positive thoughts	Unconstrained model	2.87	3	.41	.00	.00 - .21	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	2.96	4	.56	.00	.00 - .16	1.00	.09
	$\Delta_{3\text{-}2}$ equal in EX & CM	5.82	4	.21	.08	.00 - .22	1.00	2.95
	$\Delta_{3\text{-}2}$ equal in CR & CM	6.37	4	.17	.10	.00 - .23	.99	3.50
	$\Delta_{4\text{-}3}$ equal in EX & CR	3.64	5	.60	.00	.00 - .15	1.00	.70 [c]
	$\Delta_{4\text{-}3}$ equal in EX & CM	2.95	5	71	.00	.00 - .13	1.00	.01 [c]
	$\Delta_{4\text{-}3}$ equal in CR & CM	3.45	5	.63	.00	.00 - .14	1.00	.51 [c]
Perceived social threat	Unconstrained model	1.40	3	.71	.00	.00 - .16	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	1.47	4	.83	.00	.00 - .11	1.00	.07
	$\Delta_{3\text{-}2}$ equal in EX & CM	5.57	4	.23	.08	.00 - .22	.99	4.17*
	$\Delta_{3\text{-}2}$ equal in CR & CM	6.16	4	.19	.09	.00 - .23	1.00	4.76*
	$\Delta_{4\text{-}3}$ equal in EX & CR	1.49	4	.82	.00	.00 - .11	1.00	.09
	$\Delta_{4\text{-}3}$ equal in EX & CM	1.72	4	.79	.00	.00 - .12	1.00	.32
	$\Delta_{4\text{-}3}$ equal in CR & CM	1.96	4	.74	.00	.00 - .13	1.00	.56
Internalizing behavior	Unconstrained model	2.22	3	.53	.00	.00 - .19	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	2.73	4	.60	.00	.00 - .16	1.00	.51
	$\Delta_{3\text{-}2}$ equal in EX & CM	3.43	4	.49	.00	.00 - .18	1.00	1.21

	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{3\text{-}2}$ equal in CR & CM	2.32	4	.68	.00	.00 - .15	1.00	.10
	$\Delta_{4\text{-}3}$ equal in EX & CR	2.29	4	.68	.00	.00 - .14	1.00	.07
	$\Delta_{4\text{-}3}$ equal in EX & CM	6.85	4	.14	.11	.00 - .24	.99	4.63*
	$\Delta_{4\text{-}3}$ equal in CR & CM	7.54	4	.11	.12	.00 - .25	.98	5.32*
Social skills	Unconstrained model	1.51	3	.68	.00	.00 - .16	1.00	
	$\Delta_{3\text{-}2}$ equal in EX & CR	2.38	4	.66	.00	.00 - .15	1.00	1.32
	$\Delta_{3\text{-}2}$ equal in EX & CM	5.95	2	.20	.08	.00 - .22	.99	4.44*
	$\Delta_{3\text{-}2}$ equal in CR & CM	3.26	4	.51	.00	.00 - .17	1.00	1.75
	$\Delta_{4\text{-}3}$ equal in EX & CR	1.69	5	.89	.00	.00 - .08	1.00	.06 [d]
	$\Delta_{4\text{-}3}$ equal in EX & CM	1.68	5	.89	.00	.00 - .08	1.00	.05 [d]
	$\Delta_{4\text{-}3}$ equal in CR & CM	1.63	5	.90	.00	.00 - .08	1.00	.00 [d]
Self-perceived competence	Unconstrained model	7.65	6	.26	.07	.00 - .19	.99	
	$\Delta_{3\text{-}2}$ equal in EX & CR	7.81	7	.35	.04	.00 - .16	1.00	.16
	$\Delta_{3\text{-}2}$ equal in EX & CM	8.40	7	.30	.06	.00 - .17	.99	.75
	$\Delta_{3\text{-}2}$ equal in CR & CM	7.96	7	.34	.05	.00 - .17	1.00	.31
	$\Delta_{4\text{-}3}$ equal in EX & CR	12.08	4	.02	.18	.07 - .30	.97	4.42* [e]
	$\Delta_{4\text{-}3}$ equal in EX & CM	8.56	4	.07	.13	.00 - .26	.98	.90 [e]
	$\Delta_{4\text{-}3}$ equal in CR & CM	10.22	4	.04	.15	.03 - .28	.98	2.56 [e]

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; EX = Exposure condition; CR = Cognitive restructuring condition; CM = Combination condition.

* $p < .05$, ** $p < .01$, *** $p < .001$.

[a] Unconstrained post-test model: χ^2 (4) = 1.41, p = .84, RMSEA = .00 [.00 - .11], CFI = 1.00; [b] Unconstrained post-test model: χ^2 (1) = .75, p = .39, RMSEA = .00 [.00 - .31], CFI = 1.00; [c] Unconstrained post-test model: χ^2 (4) = 2.94, p = .57, RMSEA = .00 [.00 - .17], CFI = 1.00; [d] Unconstrained post-test model: χ^2 (4) = 1.63, p = .80, RMSEA = .00 [.00 - .12], CFI = 1.00; [e] Unconstrained post-test model: χ^2 (3) = 7.66, p = .05, RMSEA = .16 [.00 - .30], CFI = 1.00.

APPENDICES CHAPTER 4.

Appendix A.

Detailed overview of the interventions used in the psychophysical condition and the cognitive restructuring condition.

Table A.1. *Session Overview of the Psychophysical and Cognitive Restructuring Intervention.*

Session	Psychophysical intervention	Cognitive restructuring intervention
1.	• Introduction and acquaintance. • The golden rooster (energizer): participants practice balance by standing on 1 leg, introduction to standing firmly. • Stand like a rock: learn to stand firmly and reflect on how this makes you feel using 5 rules. • A good friend: participants pair up, one stands firm and the other gently tries to push him/her over. Participants reflect on what it is like to feel strong. • Balance on a pillow: participants stand on a pillow and another participant gently tries to unbalance him/her. • Participant folder: participants are handed a personal folder with the information on the first lesson. • Reflection on the session and closure.	• Introduction and acquaintance. • Identify positive and negative thoughts. • Ferris wheel of thoughts: practice formulating positive thoughts. • The turtle: learn to reflect on how thoughts and how this influences feelings. • Closure of the session.
2.	• Review the previous session. • Running with numbers: energizer. • A good friend: participants pair up, one stands firm and the other gently tries to push him/her over. Participants reflect on what it is like to feel strong. • Breathe high and low: children learn about stomach breathing and how this provides confidence and relaxation. • Chinese boxing: participants gently box against each other and try to unbalance each other. Participants use stomach breathing and standing firm to keep balance. • Beach stance and tunnel stance: participants experience how posture influences how they feel. • Reflection and closure.	• Review the previous session. • Fill in the Thoughts-Feelings-Behavior-model with a situation from your own experience. • Write down thoughts that emerge when hypothetical situations are mentioned (e.g. a party where you do not know anybody). Thoughts are then discussed and added to the “positive” or “negative” poster. • Closure of the session

Session	Psychophysical intervention	Cognitive restructuring intervention
3.	• Review the previous session. • Commando: game of "Simon says" to practice stomach breathing, standing firmly and speaking clearly. • Kiai: participants do a kiai, a warrior battle cry, to channel energy and make them feel strong. In the second round, children call out a positive quality they have instead of a sound. • Practice punches: participants practice a karate punch and experience that self-defense can have a positive influence on their confidence. • Punches on the pillow: participants practice punching a pillow in pairs, to experience their strength. • Saying stop: participants practice showing boundaries using posture, stomach breathing and speaking firmly. • Reflection on the session and closure.	• Review the previous session. • Create awareness that people generally notice negative things or faults in each other, learn about giving compliments and practice giving compliments. • Gossip lovingly: gossip about 1 child that is in front of the class in a loving way, only stating positive things. Following this, discuss how this made the child feel using the Thoughts-Feelings-Behavior-module. • Closure of the session.
4.	• Recapitulation of the previous session. • Commando: game of "Simon says" to practice stomach breathing, standing firmly and speaking clearly. • Avert punches: self-defense exercise to make children feel strong and resilient. • Kick the pillow: participants learn a self-defense kick, which makes them feel strong and confident. • Building a bridge: participants work together to make a human pyramid and experience strength and trusting each other. • Closure of the intervention with a certificate.	• Recapitulation of the previous session. • Sell yourself: participants reflect on their own qualities and all participants present these to the group. • Closure of the intervention with a certificate.

Appendix B.

M*plus* syntax for the unconstrained and constrained latent change models.

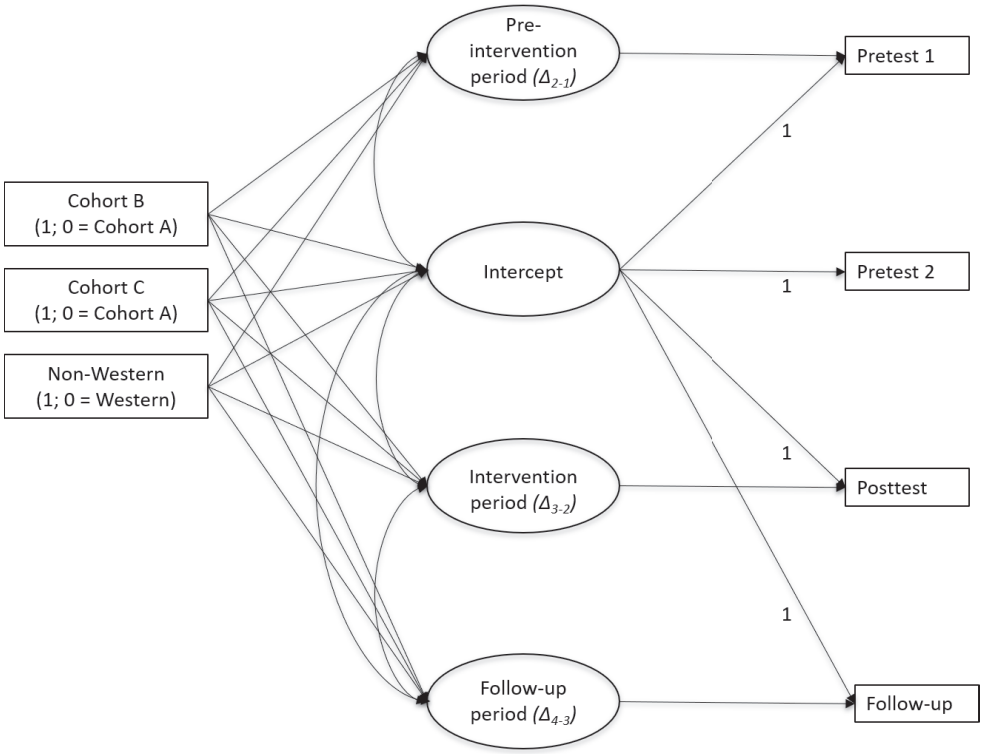
M*Plus* syntax for the unconstrained model with pretest 2 as the intercept.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);

MODEL:
intercptpre by Time1- Time4@1;
intercptpre difpre1pre2 | Time1@1 Times2@0 Time3@0 Time4@0;
intercptpre difpre2post | Time1@0 Time2@0 Time3@1 Time4@0;
intercptpre difpre2fu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time3@0;
Time4@0;
difpre1pre2 with difpre2post@0;
difpre1pre2 with difpre2fu@0;
intercptpre difpre1pre2 difpre2post difpre2fu on CohortB CohortC
Ethnicity;
```

M*plus* syntax for the constrained model with posttest as the intercept used to assess the difference between condition 2 and condition 3 on the change from pretest 2 to posttest.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);

MODEL:
intercptpost by Time1- Time4@1;
intercptpost difpre1post | Time1@1 Time2@0 Time3@0 Time4@0;
intercptpost difpre2post | Time1@0 Time2@1 Time3@0 Time4@0;
intercptpost difpostfu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time2@0;
Time4@0;
difpre2post with difpostfu@0;
difpre1post with difpostfu@0;
intercptpost difpre1post difpre2post difpostfu on CohortB CohortC
Ethnicity;
[difpre2post](100);
MODEL Condition2:
[difpre2post](1);
MODEL Condition3:
[difpre2post](1);
```

Figure 2. *Latent Change Model with Pretest 2 as the Intercept and Cohort and Ethnicity as the Covariates.*



Appendix C.

Full correlation matrices for all outcomes at pretest 1, pretest 2, posttest and follow-up.

Table C.1. *Correlations Between Outcomes at Pretest 1 (Above the Diagonal) and Pretest 2 (Beneath the Diagonal).*

	1.	2.	3.	4.	5.	6.
1. Self-worth	-	.711**	.415**	-.800**	.039	.120
2. Self-perceived competence	.804**	-	.496**	-.814**	.217**	.139
3. Self-efficacy	.565**	.419**	-	-.408**	.308**	.214**
4. Automatic thoughts	-.777**	-.837**	-.533**	-	-.214**	-.329**
5. Social skills	.185*	.294**	.324**	-.087	-	.461**
6. Assertiveness	.328**	.337**	.314**	-.092	.509**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Table C.2. *Correlations Between Outcomes at Posttest (Above the Diagonal) and Follow-Up (Beneath the Diagonal).*

	1.	3.	2.	4.	5.	6.
1. Self-worth	-	.773**	.492**	-.786**	.383**	.353**
2. Self-perceived competence	.771**	-	.602**	-.840**	.487**	.392**
3. Self-efficacy	.603**	.433**	-	-.403**	.494**	.412**
4. Automatic thoughts	-.786**	-.876**	-.600**	-	-.518**	-.459**
5. Social skills	.349**	.607**	.528**	-.388**	-	.674**
6. Assertiveness	.432**	.540**	.418**	-.376**	.685**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Appendix D.

Fit statistics for the evaluated models.

Table D.1. *Fit Statistics for the Unconstrained Latent Change Models Controlling for Cohort and Ethnicity.*

Outcome	χ^2	*df*	*p*	RMSEA	90%-CI	CFI
Self-worth	.24	3	.97	.00	.00 - .00	1.00
Self-perceived competence	2.72	3	.44	.00	.00 - .21	1.00
Self-efficacy	1.85	3	.60	.00	.00 - .18	1.00
Automatic thoughts	5.49	3	.13	.12	.00 - .27	.99
Social skills	4.35	3	.23	.09	.00 - .25	1.00
Assertiveness	5.78	3	.12	.12	.00 - .27	.99

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index;

Table D.2. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Within Conditions.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Self-worth	Unconstrained model	.24	3	.97	.00	.00 - .00	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	1.64	4	.80	.00	.00 - .12	1.00	1.40
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	4.53	4	.34	.05	.00 - .20	1.00	4.29*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	4.49	4	.34	.04	.00 - .20	1.00	4.25*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	15.74	4	.003	.22	.11 - .34	.97	15.50***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	8.56	4	.07	.14	.00 - .26	.99	8.23**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	6.47	4	.17	.10	.00 - .24	.99	6.23*
Self-perceived competence	Unconstrained model	2.72	3	.44	.00	.00 - .21	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	7.29	4	.12	.12	.00 - .25	.99	4.57*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	5.98	4	.20	.09	.00 - .23	.99	3.26
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	25.94	4	.00	.30	.20 - .42	.95	23.22***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	18.44	4	.001	.24	.14 - .36	.96	15.72***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	12.06	4	.02	.18	.07 - .30	.98	9.34**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	8.69	4	.07	.14	.00 - .27	.99	5.97*
Self-efficacy	Unconstrained model	1.85	3	.60	.00	.00 - .18	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	2.08	4	.72	.00	.00 - .14	1.00	.23
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	2.00	4	.74	.00	.00 - .14	1.00	.15

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	6.28	4	.18	.10	.00 - .23	.99	5.00*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	13.59	4	.009	.20	.09 - .32	.95	10.74***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	3.55	4	.47	.00	.00 - .18	1.00	1.70
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	2.42	4	.66	.00	.00 - .15	1.00	.57
Automatic thoughts	Unconstrained model	5.49	3	.13	.12	.00 - .27	.99	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	10.21	4	.03	.16	.04 - .27	.98	4.72*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	5.86	4	.21	.09	.00 - .23	.99	.37
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	24.09	4	.00	.29	.18 - .40	.95	13.88**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	18.74	4	.001	.25	.14 - .36	.96	13.25***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	12.19	4	.02	.18	.07 - .31	.98	6.70**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	6.38	4	.17	.10	.00 - .24	.99	.89
Social skills	Unconstrained model	4.35	3	.23	.09	.00 - .25	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	4.35	4	.36	.04	.00 - .20	1.00	.25
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	4.72	4	.32	.05	.00 - .21	1.00	.40
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	9.92	4	.04	.16	.03 - .28	.99	5.60*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	7.09	4	.13	.11	.00 - .25	.99	2.74
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	6.60	4	.16	.10	.00 - .24	.99	2.25
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	4.53	4	.34	.05	.00 - .20	1.00	.18
Assertiveness	Unconstrained model	5.78	3	.12	.12	.00 - .27	.99	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in PP	6.11	4	.19	.09	.00 - .23	.99	.33
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in PP	6.48	4	.16	.10	.00 - .24	.99	.70
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CR	17.33	4	.002	.23	.13 - .35	.94	11.55***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CR	10.39	4	.03	.16	.04 - .29	.97	5.15*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CO	20.27	4	.00	.26	.15 - .38	.93	14.49***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CO	5.78	4	.22	.09	.00 - .23	.99	.00

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; PP = psychophysical condition; CR = cognitive restructuring condition; CO = control condition.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table D.3. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Between Conditions.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Self-worth	Unconstrained model	.24	3	.97	.00	.00 - .00	1.00	
	$\Delta_{2\text{-}1}$ equal in CO and PP	.32	4	.99	.00	.00 - .00	1.00	.08
	$\Delta_{2\text{-}1}$ equal in CO and CR	1.29	4	.86	.00	.00 - .10	1.00	1.05
	$\Delta_{3\text{-}2}$ equal in CO and PP	.28	4	.99	.00	.00 - .00	1.00	.04
	$\Delta_{3\text{-}2}$ equal in CO and CR	.49	4	.97	.00	.00 - .00	1.00	.25
	$\Delta_{3\text{-}2}$ equal in PP and CR	.25	4	.99	.00	.00 - .00	1.00	.01
	$\Delta_{4\text{-}3}$ equal in CO and PP	2.31	4	.68	.00	.00 - .15	1.00	2.07
	$\Delta_{4\text{-}3}$ equal in CO and CR	4.36	4	.37	.03	.00 - .20	1.00	4.12*
	$\Delta_{4\text{-}3}$ equal in PP and CR	.52	4	.97	.00	.00 - .00	1.00	.28
Self-perceived competence	Unconstrained model	2.72	3	.44	.00	.00 - .21	1.00	
	$\Delta_{2\text{-}1}$ equal in CO and PP	3.08	4	.54	.00	.00 - .17	1.00	.36
	$\Delta_{2\text{-}1}$ equal in CO and CR	4.34	4	.35	.04	.00 - .20	1.00	1.62
	$\Delta_{3\text{-}2}$ equal in CO and PP	3.20	4	.52	.00	.00 - .17	1.00	.48
	$\Delta_{3\text{-}2}$ equal in CO and CR	2.72	4	.61	.00	.00 - .16	1.00	.00
	$\Delta_{3\text{-}2}$ equal in PP and CR	3.19	4	.53	.00	.00 - .17	1.00	.47
	$\Delta_{4\text{-}3}$ equal in CO and PP	3.44	4	.49	.00	.00 - .18	1.00	.72
	$\Delta_{4\text{-}3}$ equal in CO and CR	7.21	4	.12	.11	.00 - .25	.99	4.49*
	$\Delta_{4\text{-}3}$ equal in PP and CR	2.79	4	.59	.00	.00 - .16	1.00	.07
Self-efficacy	Unconstrained model	1.85	3	.60	.00	.00 - .18	1.00	
	$\Delta_{2\text{-}1}$ equal in CO and PP	2.20	4	.70	.00	.00 - .15	1.00	.35
	$\Delta_{2\text{-}1}$ equal in CO and CR	2.00	4	.74	.00	.00 - .14	1.00	.15
	$\Delta_{3\text{-}2}$ equal in CO and PP	2.03	4	.73	.00	.00 - .14	1.00	.18
	$\Delta_{3\text{-}2}$ equal in CO and CR	2.53	4	.64	.00	.00 - .16	1.00	.68
	$\Delta_{3\text{-}2}$ equal in PP and CR	2.55	4	.63	.00	.00 - .16	1.00	.70
	$\Delta_{4\text{-}3}$ equal in CO and PP	2.22	4	.69	.00	.00 - .15	1.00	.37
	$\Delta_{4\text{-}3}$ equal in CO and CR	5.22	4	.26	.07	.00 - .22	.99	2.36
	$\Delta_{4\text{-}3}$ equal in PP and CR	1.94	4	.75	.00	.00 - .14	1.00	.09
Automatic thoughts	Unconstrained model	5.49	3	.13	.12	.00 - .27	.99	
	$\Delta_{2\text{-}1}$ equal in CO and PP	6.75	4	.15	.11	.00 - .24	.99	1.26

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{2\text{-}1}$ equal in CO and CR	7.54	4	.11	.12	.00 - .25	.99	2.05
	$\Delta_{3\text{-}2}$ equal in CO and PP	5.67	4	.22	.08	.00 - .22	1.00	.18
	$\Delta_{3\text{-}2}$ equal in CO and CR	5.66	4	.22	.08	.00 - .22	1.00	.17
	$\Delta_{3\text{-}2}$ equal in PP and CR	5.53	4	.24	.08	.00 - .22	1.00	.04
	$\Delta_{4\text{-}3}$ equal in CO and PP	5.50	4	.24	.08	.00 - .22	1.00	.01
	$\Delta_{4\text{-}3}$ equal in CO and CR	13.75	4	.01	.20	.09 - .32	.97	8.26**
	$\Delta_{4\text{-}3}$ equal in PP and CR	7.38	4	.12	.12	.00 - .25	.99	1.89
Social skills	Unconstrained model	4.35	3	.23	.09	.00 - .25	1.00	
	$\Delta_{2\text{-}1}$ equal in CO and PP	4.46	4	.35	.04	.00 - .20	1.00	.11
	$\Delta_{2\text{-}1}$ equal in CO and CR	4.36	4	.36	.04	.00 - .20	1.00	.01
	$\Delta_{3\text{-}2}$ equal in CO and PP	4.40	4	.35	.04	.00 - .20	1.00	.05
	$\Delta_{3\text{-}2}$ equal in CO and CR	4.42	4	.35	.04	.00 - .20	1.00	.07
	$\Delta_{3\text{-}2}$ equal in PP and CR	5.18	4	.27	.07	.00 - .22	1.00	.83
	$\Delta_{4\text{-}3}$ equal in CO and PP	5.27	4	.26	.07	.00 - .22	1.00	.92
	$\Delta_{4\text{-}3}$ equal in CO and CR	5.57	4	.23	.08	.00 - .22	1.00	1.22
	$\Delta_{4\text{-}3}$ equal in PP and CR	4.78	3	.31	.06	.00 - .21	1.00	.43
Assertiveness	Unconstrained model	5.78	3	.12	.12	.00 - .27	.99	
	$\Delta_{2\text{-}1}$ equal in CO and PP	6.80	4	.15	.11	.00 - .24	.99	1.02
	$\Delta_{2\text{-}1}$ equal in CO and CR	6.03	4	.20	.09	.00 - .23	.99	.25
	$\Delta_{3\text{-}2}$ equal in CO and PP	6.44	4	.17	.10	.00 - .24	.99	.66
	$\Delta_{3\text{-}2}$ equal in CO and CR	6.08	4	.19	.09	.00 - .23	.99	.30
	$\Delta_{3\text{-}2}$ equal in PP and CR	6.88	4	.14	.11	.00 - .24	.99	1.10
	$\Delta_{4\text{-}3}$ equal in CO and PP	8.08	4	.09	.13	.00 - .26	.98	2.30
	$\Delta_{4\text{-}3}$ equal in CO and CR	8.37	4	.08	.13	.00 - .26	.98	2.59
	$\Delta_{4\text{-}3}$ equal in PP and CR	6.56	4	.16	.10	.00 - .24	.99	.78

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; PP = psychophysical condition; CR = cognitive restructuring condition; CO = control condition.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

APPENDICES CHAPTER 5.

Appendix A.

Overview of the modules used.

Table A.1. *Overview of the Exercises in the Social Skills Intervention and the Social Skills Intervention Including the Autonomy Affirmation Component.*

Session	Exercises in the social skills intervention	Exercises in the social skills intervention with autonomy affirmation
1.	1. Introduction of the intervention. 2. Connecting with the trainer in a trusting way.* 3. Exercise to practice looking others in the eye.* 4. Exercise to practice standing tall and with confidence. 5. Vocalization exercise to allow children to experience their vocal range and to teach them to speak at a clear, appropriate level. 6. Introducing yourself to others, during which they keep in mind what they have learned about looking others in the eye, standing with confidence and speaking clearly. 7. Closure of the session.	1. Introduction of the intervention. 2. Connecting with the trainer in a trusting way. 3. Caps exercise to teach children that there are four types of behavior (black: aggressive and dominating; yellow: shy and anxious; red: annoyingly funny and careless; white: authentic and trustworthy). 4. Explanation of importance of being authentic and trustworthy (white cap). 5. Exercise to practice looking others in the eye.* 6. Self-reflection exercise asking children to evaluate their own behavior in the classroom. 7. Explanation of worksheet with caps that children complete with their parents. 8. Closure of the session.
2.	1. Opening of the session. 2. Review of exercises from the previous session.* 3. Exercise aimed at increasing children's emotion vocabulary. Distinguish between positive and negative emotions. 4. Exercises acting out emotion-words, aimed at teaching children that body language reflects emotions. 5. Exercise to practice giving and receiving compliments in an appropriate way. 6. Exercises to increase children's awareness of what a person's qualities can be and to teach children that everybody has positive qualities. 7. Explanation of a worksheet that children fill in with their parents, listing the positive qualities that make them unique. 8. Closure of the session.	1. Opening of the session. 2. Review of exercises from the previous session.* 3. Exercise to teach children how their behavior/attention can encourage negative and unacceptable behavior in others. 4. Exercise to practice standing tall and with confidence.* 5. Exercise to practice giving and receiving compliments in an appropriate way.* 6. Trust exercises aimed at teaching children they have social responsibility and to physically interact with each other in a respectful way. 7. Closure of the session.

Session	Exercises in the social skills intervention	Exercises in the social skills intervention with autonomy affirmation
3.	1. Opening of the session. 2. Review of the exercises from the previous session.* 3. Discuss the qualities worksheet that children completed with their parents. 4. Exercise aimed at teaching children a conversations technique to show an interest in others: asking short questions.* 5. Exercise aimed at teaching children a conversation technique to get to know others better: listening to others well and asking in depth questions.* 6. Exercise to stimulate teamwork and practice with both leading and following another person. 7. Closure of the session.	1. Opening of the session. 2. Review of the exercises from the previous session.* 3. Exercise aimed at teaching children to show their boundaries and saying "no" to others.* 4. Exercise using statements to reflect on what it means to be a good friend (stimulate each other to behave in a prosocial way). 5. Exercise to practice behaving in a authentic, trustworthy manner, even when others behave negatively. 6. Explanation of strategy to handle a situation in which the child has indicated it's boundary, but a peer continues negative behavior. 7. Feedback exercise aimed at children becoming aware of how peers view them. 8. Closure of the session.
4.	1. Opening of the session. 2. Review of the exercises from the previous session. 3. Exercise aimed at teaching children to show their personal boundaries by saying "no" to others.* 4. Exercise aimed at teaching children to control their impulses. 5. Explanation of strategies to stay calm when children need to control their emotions/impulses. 6. Exercises aimed at allowing children to practice with impulse control strategies. 7. Trust fall exercise aimed at increasing children's trust in each other. 8. Closure of the intervention program with a certificate.	1. Opening of the session. 2. Review of exercises from the previous session. 3. Exercise to stimulate children to talk about their feelings, especially when they feel sad or lonely. 4. Feedback exercises aimed at children becoming aware of how peers view them. 5. Stage dive exercise aimed at increasing children's trust in each other. 6. Closure of the intervention program with a cetrificate.

Note. Exercises indicated by an asterix (*) were the same in both intervention modules.

Explanation of the caps-exercise (SS-AA-intervention exercise 3, session 1)

An example of a key exercise in the intervention with the autonomy affirmation component (SS-AA-condition) is the caps-exercise. This is an exercise that stimulates children to reflect on their behavior using caps that represent three qualities of behavior and three pitfalls. The white cap represents trust and authenticity. This combination builds on the vision that by far the most people have the (authentic) desire to be trusted and to find solutions that increase well-being of the self and others. When the white cap is combined with the other coloured caps, people show trustworthy behavior according to their desires: (white-black: trustworthy with power, white-yellow: trustworthy with empathy and white-red: trustworthy with humour). When trust is gone (in the group) or one does not act upon one's own autonomous (prosocial) desires, the white cap moves away and one shows the pitfall of each strength: too powerful behavior (black cap: bossy, bullying), too sensitive behavior (yellow cap: shy, anxious, pittyful) or too funny behavior (red cap: laughing at others, supporting the black cap behavior). In this exercise, children become aware of their own and others behavior and of the consequences of their behavior (in feedback exercises). They become motivated to act upon their positive intentions and learn that they can choose how to behave (which cap(s) you choose to wear).

Appendix B.

M*plus* syntax for the unconstrained and constrained latent change models.

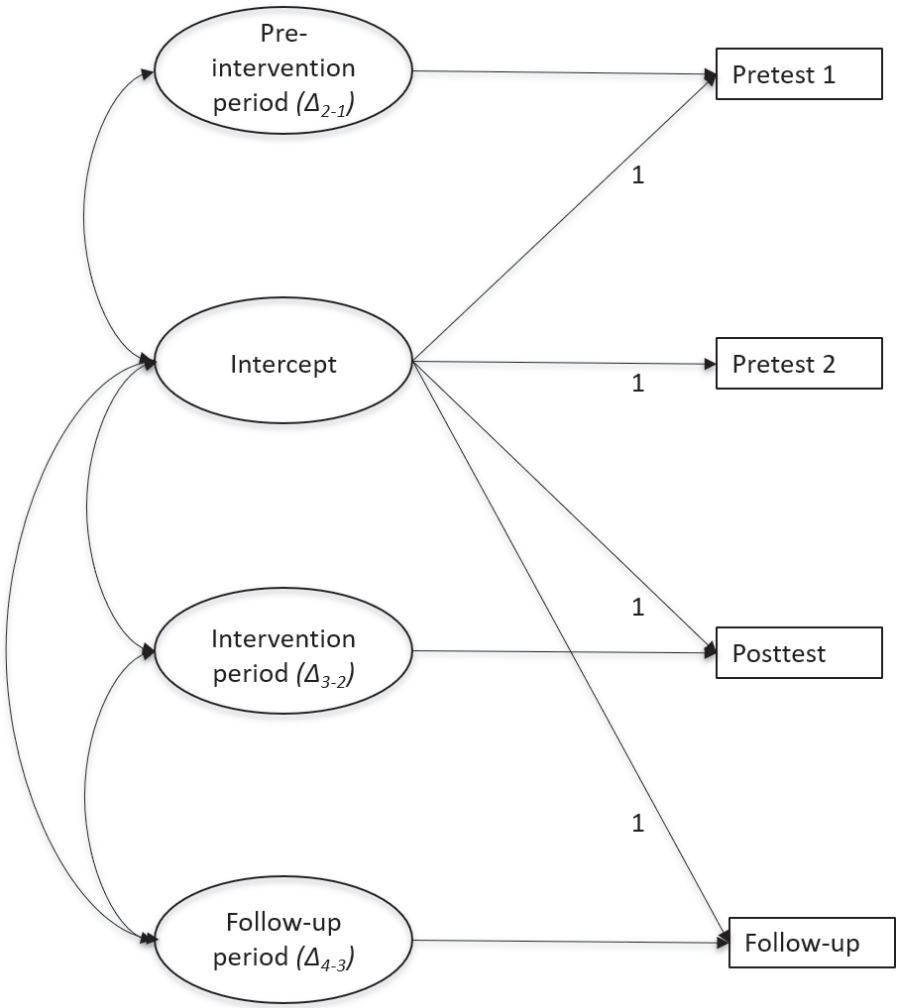
M*Plus* syntax for the unconstrained model with pretest 2 as the intercept.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);
ANALYSIS:
TYPE = COMPLEX;
ESTIMATOR = MLR;

MODEL:
intercptpre by Time1- Time4@1;
intercptpre difpre1pre2 | Time1@1 Times2@0 Time3@0 Time4@0;
intercptpre difpre2post | Time1@0 Time2@0 Time3@1 Time4@0;
intercptpre difpre2fu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time3@0;
Time4@0;
difpre1pre2 with difpre2post@0;
difpre1pre2 with difpre2fu@0;
```

M*plus* syntax for the constrained model with posttest as the intercept used to assess the difference between condition 2 and condition 3 on the change from pretest 2 to posttest.

```
GROUPING = Group (0=Condition1 1=Condition2 2=Condition3);
ANALYSIS:
TYPE = COMPLEX;
ESTIMATOR = MLR;

MODEL:
intercptpost by Time1- Time4@1;
intercptpost difpre1post | Time1@1 Time2@0 Time3@0 Time4@0;
intercptpost difpre2post | Time1@0 Time2@1 Time3@0 Time4@0;
intercptpost difpostfu | Time1@0 Time2@0 Time3@0 Time4@1;
Time1@0;
Time2@0;
Time4@0;
difpre2post with difpostfu@0;
difpre1post with difpostfu@0;
 [difpre2post](100);
MODEL Condition2:
[difpre2post](1);
MODEL Condition3:
[difpre2post](1);
```

Figure B.1. *Latent Change Model with Pretest 2 as the Intercept.*



Appendix C.

Correlations between outcome measures at all measurement occasions.

Table C.1. *Correlation Between Outcomes at Pretest 1 (Above the Diagonal) and Pretest 2 (Below the Diagonal).*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Prosocial behavior	-	.67**	.30**	.49**	.40**	.27**	-.12**	-.35**
2. Social skills	.66**	-	.34**	.61**	.52**	.25**	-.20**	-.47**
3. Self-esteem	.35**	.36**	-	.45**	.64**	.14**	-.52**	-.34**
4. Self-efficacy	.50**	.60**	.50**	-	.54**	.26**	-.30**	-.33**
5. Self-perceived competence	.43**	.50**	.72**	.54**	-	.18**	-.56**	-.47*
6. Class climate	.26**	.24**	.13**	.25**	.17**	-	-.02	.03
7. Internalizing behavior	-.20**	-.18**	-.61**	-.35**	-.60**	-.03	-	.42**
8. Externalizing behavior	-.39**	-.46**	-.33**	-.35**	-.50**	.10*	.49**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Table C.2. *Correlations Between Outcomes at Posttest (Above the Diagonal) and Follow-up (Below the Diagonal).*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Prosocial behavior	-	.69**	.44**	.54**	.48**	.33**	-.24**	-.43**
2. Social skills	.64**	-	.39**	.61**	.52**	.32**	-.26**	-.47**
3. Self-esteem	.35**	.40**	-	.48**	.71**	.15**	-.63**	-.47**
4. Self-efficacy	.53**	.62**	.44**	-	.53**	.32**	-.30**	-.36**
5. Self-perceived competence	.47**	.55**	.68**	.50**	-	.19**	-.62**	-.56**
6. Class climate	.33**	.30**	.12**	.26**	.19**	-	-.04	.05
7. Internalizing behavior	-.28**	-.33**	-.59**	-.35**	-.61**	-.03	-	.55**
8. Externalizing	-.45**	-.50**	.41**	-.35**	-.54	.04	.65**	-

*$p < .05$, **$p < .01$, ***$p < .001$.

Appendix D.

Fit statistics for the evaluated models.

Table D.1. *Fit Indices for the Unconstrained Latent Change Models.*

Outcome	χ^2	*df*	*p*	Scaling corrector	RMSEA	95%-CI	CFI
Prosocial behavior	4.98	3	.17	1.3934	.05	.00 - .13	1.00
Social skills	7.35	3	.06	.9452	.07	.00 - .14	.99
Self-esteem	4.01	3	.26	1.8852	.04	.00 - .12	1.00
Self-efficacy	1.68	3	.64	1.2978	.00	.00 - .08	1.00
Self-perceived competence	4.48	3	.21	1.6862	.04	.00 - .12	1.00
Class climate	2.91	3	.40	1.0477	.00	.00 - .10	1.00
Internalizing behavior	1.58	3	.66	1.2738	.00	.00 - .08	1.00
Externalizing behavior	.60	3	.89	1.1829	.00	.00 - .05	1.00

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index.

Table D.2. *Model Fit Statistics for Latent Change Models Used to Assess the Equality of Parameters Within Conditions.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Prosocial behavior	Unconstrained model	4.98	3	.17	.05	.00 - .13	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS	5.78	4	.22	.04	.00 - .11	1.00	.80
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS	6.17	4	.19	.05	.00 - .11	1.00	1.19
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS-AA	25.68	4	.00	.14	.09 - .20	.96	20.70***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS-AA	6.26	4	.18	.05	.00 - .11	1.00	1.28
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CTRL	11.49	4	.02	.08	.03 - .14	.99	6.51**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CTRL	8.93	4	.06	.07	.00 - .13	.99	3.94*
Social skills	Unconstrained model	7.35	3	.06	.07	.00 - .14	.99	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS	10.79	4	.03	.08	.02 - .14	.99	3.44
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS	11.60	4	.02	.09	.03 - .14	.99	4.25*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS-AA	30.04	4	.00	.16	.11 - .21	.97	22.69***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS-AA	12.81	4	.01	.09	.04 - .15	.99	5.46*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CTRL	36.54	4	.00	.18	.13 - .23	.96	29.18***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CTRL	5.37	4	.25	.04	.00 - .11	1.00	1.98
Self-esteem	Unconstrained model	4.01	3	.26	.04	.00 - .12	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS	10.76	4	.03	.08	.02 - .14	.99	6.75**

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	Δ_{3-2} and Δ_{4-3} equal in SS	6.38	4	.17	.05	.00 - .11	1.00	2.37
	Δ_{2-1} and Δ_{3-2} equal in SS-AA	26.60	4	.00	.15	.10 - .20	.97	22.59***
	Δ_{3-2} and Δ_{4-3} equal in SS-AA	14.15	4	.01	.10	.05 - .16	.98	10.14**
	Δ_{2-1} and Δ_{3-2} equal in CTRL	16.29	4	.00	.11	.06 - .17	.98	12.28***
	Δ_{3-2} and Δ_{4-3} equal in CTRL	15.95	4	.00	.11	.06 - .16	.98	11.94***
Self-efficacy	Unconstrained model	1.68	3	.64	.00	.00 - .08	1.00	
	Δ_{2-1} and Δ_{3-2} equal in SS	8.69	4	.07	.07	.00 - .13	.99	7.01*
	Δ_{3-2} and Δ_{4-3} equal in SS	2.94	4	.57	.00	.00 - .08	1.00	1.26
	Δ_{2-1} and Δ_{3-2} equal in SS-AA	13.01	4	.01	.09	.04 - .15	1.00	11.33**
	Δ_{3-2} and Δ_{4-3} equal in SS-AA	1.91	4	.75	.00	.00 - .06	1.00	.23
	Δ_{2-1} and Δ_{3-2} equal in CTRL	32.36	4	.00	.16	.11 - .22	.96	30.68***
	Δ_{3-2} and Δ_{4-3} equal in CTRL	19.29	4	.00	.12	.07 - .18	.98	17.61***
Self-perceived competence	Unconstrained model	4.48	3	.21	.04	.00 - .12	1.00	
	Δ_{2-1} and Δ_{3-2} equal in SS	15.26	4	.00	.10	.05 - .16	.98	11.14***
	Δ_{3-2} and Δ_{4-3} equal in SS	6.24	4	.18	.05	.00 - .11	1.00	1.76
	Δ_{2-1} and Δ_{3-2} equal in SS-AA	35.98	4	.00	.18	.13 - .23	.94	31.50***
	Δ_{3-2} and Δ_{4-3} equal in SS-AA	7.08	4	.13	.05	.00 - .12	.99	2.60
	Δ_{2-1} and Δ_{3-2} equal in CTRL	11.70	4	.02	.09	.03 - .15	.99	7.22**
	Δ_{3-2} and Δ_{4-3} equal in CTRL	13.87	4	.01	.10	.04 - .16	.98	9.39**
Class climate	Unconstrained model	2.91	3	.40	.00	.00 - .10	1.00	
	Δ_{2-1} and Δ_{3-2} equal in SS	3.26	4	.51	.00	.00 - .09	1.00	.35
	Δ_{3-2} and Δ_{4-3} equal in SS	2.51	4	.64	.00	.00 - .08	1.00	.40
	Δ_{2-1} and Δ_{3-2} equal in SS-AA	3.21	4	.52	.00	.00 - .08	1.00	.30
	Δ_{3-2} and Δ_{4-3} equal in SS-AA	4.39	4	.36	.02	.00 - .10	1.00	1.48
	Δ_{2-1} and Δ_{3-2} equal in CTRL	3.71	4	.45	.00	.00 - .09	1.00	.80
	Δ_{3-2} and Δ_{4-3} equal in CTRL	5.45	4	.24	.04	.00 - .11	1.00	2.54
Internalizing behavior	Unconstrained model	1.58	3	.66	.00	.00 - .08	1.00	
	Δ_{2-1} and Δ_{3-2} equal in SS	10.10	4	.04	.08	.02 - .14	.99	8.52**
	Δ_{3-2} and Δ_{4-3} equal in SS	1.74	4	.78	.00	.00 - .06	1.00	.16

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS-AA	33.52	4	.00	.17	.12 - .22	.93	31.94***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS-AA	14.22	4	.00	.10	.05 - .16	.98	12.64***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CTRL	20.03	4	.00	.12	.07 - .18	.96	18.45***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CTRL	1.77	4	.78	.00	.00 - .06	1.00	.19
Externalizing behavior	Unconstrained model	.60	3	.89	.00	.00 - .05	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS	6.49	4	.16	.05	.00 - .11	1.00	5.89*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS	.66	4	.96	.00	.00 - .00	1.00	.06
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in SS-AA	22.89	4	.00	.13	.08 - .19	.97	22.29***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in SS-AA	7.33	4	.12	.06	.00 - .12	.99	6.73**
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in CTRL	2.07	4	.72	.00	.00 - .07	1.00	1.47
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in CTRL	.65	4	.96	.00	.00 - .00	1.00	.05

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; SS-condition = social skills intervention; SS-AA-condition = social skills intervention with autonomy affirmation; CTRL = no-treatment control condition. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table D.2. *Model Fit Statistics for Latent Change Models Used to Assess the Equality of Parameters Between Conditions.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Prosocial behavior	Unconstrained model	4.98	3	.17	.05	.00 - .13	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	8.64	4	.07	.07	.00 - .13	.99	3.66*
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	5.25	4	.26	.03	.00 - .10	1.00	.30
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	7.93	4	.09	.06	.00 - .12	.99	2.95
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	5.49	4	.24	.04	.00 - .11	1.00	.51
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	5.83	4	.21	.04	.00 - .11	1.00	.85
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	5.52	4	.24	.04	.00 - .11	1.00	.54
Social skills	Unconstrained model	7.35	3	.06	.07	.00 - .14	.99	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	6.87	4	.14	.05	.00 - .12	1.00	.48
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	7.17	4	.13	.05	.00 - .12	1.00	.18
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	7.12	4	.13	.05	.00 - .12	1.00	.23
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	6.23	4	.18	.05	.00 - .11	1.00	1.12
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	8.11	4	.09	.06	.00 - .13	.99	.76

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	6.65	4	.16	.05	.00 - .12	1.00	.70
Self-esteem	Unconstrained model	4.01	3	.26	.04	.00 - .12	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	4.92	4	.29	.03	.00 - .10	1.00	.91
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	5.13	4	.27	.03	.00 - .10	1.00	1.12
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	4.84	4	.30	.03	.00 - .10	1.00	.08
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	5.47	4	.24	.04	.00 - .11	1.00	1.46
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	4.74	4	.31	.03	.00 - .10	1.00	.73
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	5.12	4	.27	.03	.00 - .10	1.00	1.11
Self-efficacy	Unconstrained model	1.68	3	.64	.00	.00 - .08	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	2.24	4	.69	.00	.00 - .07	1.00	.56
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	2.14	4	.71	.00	.00 - .07	1.00	.46
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	1.89	4	.76	.00	.00 - .06	1.00	.21
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	2.47	4	.65	.00	.00 - .07	1.00	.79
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	4.56	4	.33	.02	.00 - .10	1.00	2.88
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	2.35	4	.67	.00	.00 - .07	1.00	.67
Self-perceived competence	Unconstrained model	4.48	3	.21	.04	.00 - .12	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	5.72	4	.22	.04	.00 - .11	1.00	1.24
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	5.15	4	.27	.03	.00 - .10	1.00	.67
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	6.31	4	.18	.05	.00 - .11	1.00	1.83
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	5.49	4	.24	.04	.00 - .11	1.00	1.01
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	7.97	4	.09	.06	.00 - .12	.99	3.49
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	5.78	4	.22	.04	.00 - .11	1.00	1.30
Class climate	Unconstrained model	2.91	3	.40	.00	.00 - .10	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	2.96	4	.56	.00	.00 - .08	1.00	.05
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	3.62	4	.46	.00	.00 - .09	1.00	.71
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	2.89	4	.58	.00	.00 - .08	1.00	.02
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	3.49	4	.48	.00	.00 - .08	1.00	.58
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	3.46	4	.48	.00	.00 - .09	1.00	.55
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	4.43	4	.35	.02	.00 - .10	1.00	1.52
Internalizing behavior	Unconstrained model	1.58	3	.66	.00	.00 - .08	1.00	

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	2.16	4	.71	.00	.00 - .07	1.00	.58
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	1.88	4	.76	.00	.00 - .06	1.00	.30
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	1.72	4	.79	.00	.00 - .06	1.00	.14
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	1.84	4	.76	.00	.00 - .06	1.00	.26
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	8.76	4	.07	.07	.00 - .13	.99	7.18**
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	5.94	4	.20	.04	.00 - .11	1.00	4.36*
Externalizing behavior	Unconstrained model	.60	3	.89	.00	.00 - .05	1.00	
	$\Delta_{3\text{-}2}$ equal in SS & CTRL	1.06	4	.90	.00	.00 - .04	1.00	.46
	$\Delta_{3\text{-}2}$ equal in SS-AA & CTRL	2.26	4	.69	.00	.00 - .07	1.00	1.66
	$\Delta_{3\text{-}2}$ equal in SS & SS-AA	2.55	4	.63	.00	.00 - .08	1.00	1.95
	$\Delta_{4\text{-}3}$ equal in SS & CTRL	.98	4	.91	.00	.00 - .04	1.00	.38
	$\Delta_{4\text{-}3}$ equal in SS-AA & CTRL	12.98	4	.01	.09	.04 - .15	.98	12.38***
	$\Delta_{4\text{-}3}$ equal in SS & SS-AA	13.76	4	.01	.10	.04 - .15	.98	13.16***

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; SS-condition = social skills intervention; SS-AA-condition = social skills intervention with autonomy affirmation; CTRL = no-treatment control condition.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Appendix E.

Results from additional analyses with a subgroup of children from the SS-AA-condition scoring +1*SD* on externalizing behavior at pretest 1.

Table E.1. *Fit Indices for the Unconstrained Latent Change Models.*

Outcome	χ^2	*df*	*p*	RMSEA	95%-CI	CFI
Prosocial behavior	10.58	2	.005	.19	.09 - .31	.93
Social skills	23.60	2	.00	.30	.20 - .41	.95
Self-esteem	.89	2	.64	.00	.00 - .14	1.00
Self-efficacy	1.89	2	.38	.00	.00 - .18	1.00
Self-perceived competence	3.09	2	.21	.07	.00 - .20	1.00
Class climate	41.73	2	.00	.40	.30 - .51	.84
Internalizing behavior	2.51	2	.28	.05	.00 - .19	1.00
Externalizing behavior	2.57	2	.27	.05	.00 - .19	1.00

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index;

Table E.2. *Model Parameters for the Unconstrained Latent Change Models.*

	LOW (*n* = 206)				**HIGH (*n* = 37)**			
	intercept	$\Delta_{2\text{-}1}$	$\Delta_{3\text{-}2}$	$\Delta_{4\text{-}3}$	intercept	$\Delta_{2\text{-}1}$	$\Delta_{3\text{-}2}$	$\Delta_{4\text{-}3}$
Outcome	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*	*μ (SE)*
Self-esteem	21.84 (.30)	.79* (.36)	**.83**** (.29)	.04$_a$ (.22)	18.44 (.88)	-1.03 (.71)	.38 (.75)	**2.64**$^{**}_a$ (.86)
Self-efficacy	31.29 (.50)	.52 (.40)	**.65*** (.27)	-.38 (.36)	28.70 (.51)	.80 (.65)	.09 (.98)	-.29 (.58)
Self-perceived competence	61.76 (.56)	**1.49**** (.53)	1.35** (.47)	-.62 (.33)	55.79 (1.14)	3.91* (1.79)	-1.47 (1.28)	2.11 (1.24)
Internalizing behavior	16.88 (.40)	**-1.51***** (.33)	-.65 (.40)	-.35 (.25)	20.80 (1.39)	-2.56*** (.62)	-.78 (1.31)	-1.60 (1.49)
Externalizing behavior	21.27 (.27)	**-1.34**** (.33)	-.13 (.41)	-.43$_a$ (.31)	3571 (.68)	**-4.87***** (.84)	1.71 (.90)	-4.48$^{***}_a$ (.70)

Note. LOW = children scoring <+1*SD* on externalizing behavior at pretest 1; HIGH = children scoring ≥ + 1*SD* on externalizing behavior at pretest 1; Intercept = pretest 1; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period. Latent means in bold differ significantly from the within-group (pre-)intervention period at $p < .05$. Latent means that share subscripts differ at $p < .05$.

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table E.3. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Within Subgroups.*

	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Self-esteem	Unconstrained model	.89	2	.64	.00	.00 - .14	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in LOW	22.07	3	.00	.23	.15 - .32	.94	21.18***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in LOW	6.87	3	.08	.10	.00 - .21	.99	5.98*
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in HIGH	3.01	3	.39	.00	.00 - .15	1.00	2.12
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in HIGH	10.55	3	.01	.14	.06 - .34	.98	9.66**
Self-efficacy	Unconstrained model	1.89	2	.38	.00	.00 - .18	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in LOW	12.91	3	.00	.16	.08 - .26	.98	11.02**
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in LOW	2.99	3	.51	.00	.00 - .14	1.00	1.10
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in HIGH	2.51	3	.47	.00	.00 - .14	1.00	.62
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in HIGH	2.18	3	.53	.00	.00 - .14	1.00	.29
Self-perceived competence	Unconstrained model	3.09	2	.21	.07	.00 - .20	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in LOW	54.78	3	.00	.38	.29 - .47	.85	51.69***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in LOW	5.39	3	.14	.08	.00 - .19	.99	2.30
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in HIGH	3.93	3	.27	.05	.00 - .17	1.00	.84
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in HIGH	2.82	3	.42	.00	.00 - .15	1.00	.27
Internalizing behavior	Unconstrained model	2.51	2	.28	.05	.00 - .19	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in LOW	33.14	3	.00	.29	.20 - .38	.88	30.63***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in LOW	14.29	3	.00	.18	.09 - .27	.96	11.78***
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in HIGH	5.31	3	.15	.08	.00 - .19	.99	2.80
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in HIGH	5.01	3	.17	.07	.00 - .18	.99	2.50
Externalizing behavior	Unconstrained model	2.57	2	.27	.05	.00 - .19	1.00	
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in LOW	18.05	3	.00	.20	.12 - .30	.92	15.48***
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in LOW	4.81	3	.19	.07	.00 - .18	.99	2.24
	$\Delta_{2\text{-}1}$ and $\Delta_{3\text{-}2}$ equal in HIGH	8.01	3	.05	.12	.01 - .22	.97	5.44*
	$\Delta_{3\text{-}2}$ and $\Delta_{4\text{-}3}$ equal in HIGH	18.03	3	.00	.20	.12 - .30	.92	15.46***

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{2\text{-}1}$ = pre-intervention period; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; LOW = children scoreing <+1SD on externalizing behavior at pretest 1; HIGH = children scoring ≥ + 1SD on externalizing behavior at pretest 1.

*$p < .05$, **$p < .01$, ***$p < .001$.

Table E.4. *Model Fit Statistics for the Latent Change Models Used to Assess the Equality of Parameters Between Subgroups.*

Outcome	Model	χ^2	*df*	*p*	RMSEA	95%-CI	CFI	$\Delta\chi^2$
Self-esteem	Unconstrained model	.89	2	.64	.00	.00 - .14	1.00	
	$\Delta_{3\text{-}2}$ equal in LOW & HIGH	1.27	3	.74	.00	.00 - .11	1.00	.38
	$\Delta_{4\text{-}3}$ equal in LOW & HIGH[a]	11.56	3	.00	.15	.07 - .25	.97	10.12***
Self-efficacy	Unconstrained model	1.89	3	.38	.00	.00 - .18	1.00	
	$\Delta_{3\text{-}2}$ equal in LOW & HIGH	2.39	3	.49	.00	.00 - .14	1.00	.50
	$\Delta_{4\text{-}3}$ equal in LOW & HIGH	2.33	3	.51	.00	.00 - .14	1.00	.44
Self-perceived competence	Unconstrained model	3.09	2	.21	.07	.00 - .20	1.00	
	$\Delta_{3\text{-}2}$ equal in LOW & HIGH	5.58	3	.13	.08	.00 - .19	.99	2.49
	$\Delta_{4\text{-}3}$ equal in LOW & HIGH	5.41	3	.14	.08	.00 - .19	.99	2.32
Internalizing behavior	Unconstrained model	2.51	2	.28	.05	.00 - .19	1.00	
	$\Delta_{3\text{-}2}$ equal in LOW & HIGH	2.14	3	.54	.00	.00 - .13	1.00	.37
	$\Delta_{4\text{-}3}$ equal in LOW & HIGH	3.55	3	.31	.04	.00 - .16	1.00	1.04
Externalizing behavior	Unconstrained model	2.57	2	.27	.05	.00 - .19	1.00	
	$\Delta_{3\text{-}2}$ equal in LOW & HIGH	5.48	3	.14	.08	.00 - .19	.99	2.91
	$\Delta_{4\text{-}3}$ equal in LOW & HIGH	21.30	3	.00	.22	.14 - .32	.90	18.73***

Note. RMSEA = Root Mean Square Error of Approximation; 95%-CI = 95% confidence interval; CFI = Comparative Fit Index; $\Delta_{3\text{-}2}$ = intervention period; $\Delta_{4\text{-}3}$ = follow-up period; LOW = children scoreing <+1SD on externalizing behavior at pretest 1; HIGH = children scoring ≥ + 1SD on externalizing behavior at pretest 1. [a]Compared to a model with model fit: χ^2 (2) = 1.47, p = .48, RMSEA = .00 [.00 - .16], CFI = 1.00. *p < .05, **p < .01, ***p < .001.

A

NEDERLANDSE SAMENVATTING

De Zwarte Doos van Interventies Gericht op Sociaal-Emotionele Vaardigheden: Onderzoek naar Effectieve Interventie Componenten

Sociale en emotionele vaardigheden dragen bij aan ons succes in interpersoonlijke interacties. Denk hierbij aan interacties als het durven beginnen van een gesprek, het aangeven van grenzen, oplossen van problemen of het vragen om hulp. Dergelijke alledaagse taken vragen om een geraffineerd samenspel van vaardigheden zoals het reguleren van je emoties, verplaatsen in de emoties van anderen, juist interpreteren van sociale signalen en adequate communicatieve vaardigheden. Om dit soort vaardigheden te stimuleren en versterken, hebben sociaal-emotionele vaardigheidstrainingen en interventies voor kinderen en adolescenten het afgelopen decennia aan terrein gewonnen. De opkomst van sociaal-emotionele vaardigheidsinterventies werd mede gestimuleerd door wetenschappelijke kennis over het belang van deze vaardigheden voor een gezonde ontwikkeling. Zo liet onderzoek zien dat een tekort aan sociaal-emotionele vaardigheden gerelateerd is aan een tal van ongunstige uitkomsten. Zo is een tekort aan sociaal-emotionele vaardigheden gerelateerd aan internaliserende en externaliserende gedragsproblemen, en problemen in de interacties met leeftijdgenoten. Verminderde sociaal-emotionele vaardigheden hebben niet alleen op de korte termijn een negatieve invloed, ook op de lange termijn is dit ongunstig. In volwassenheid is een tekort aan sociaal-emotionele vaardigheden gerelateerd aan gedragsproblemen, risicovol gezondheidsgedrag (zoals middelenmisbruik en delinquentie), en verminderd succes op de arbeidsmarkt.

Interventies met als doel sociaal-emotionele vaardigheden te versterken kunnen zich richten op verschillende niveaus van preventie bij verschillende subgroepen kinderen en adolescenten. Het gaat hierbij om universele interventies (ontworpen om alle kinderen en adolescenten te dienen, ook als er nog geen problemen zichtbaar zijn), selectieve interventies (gericht op kinderen en adolescenten met beginnende problemen) en geïndiceerde interventies (gericht op kinderen en adolescenten met specifieke problematiek). Universele en selectieve interventies worden vaak in de school-context uitgevoerd en zijn het onderwerp van dit proefschrift.

Met de opkomst van sociaal-emotionele vaardigheidstrainingen en interventies werd ook een onderzoeksveld in beweging gebracht waarin de effecten van dit soort interventies wordt onderzocht. Dergelijk onderzoek liet zien dat sociaal-emotionele interventies, over het algemeen, een gemiddeld positief effect hebben op de sociaal-emotionele vaardigheden van kinderen. Tot nu toe richtte dergelijk onderzoek zich echter vooral op de effecten van interventies als geheel. Hoewel dit ons informatie verschaft over de effecten van een interventie als compleet pakket weten we nog onvoldoende wat maakt dat dit soort interventies werken.

Nu we weten dat sommige interventies effecten sorteren, is een volgende vraag die zich opdient:

Welke "ingrediënten", ook wel interventie componenten genoemd, zijn verantwoordelijk voor de effecten die worden gevonden voor interventies gericht op het versterken van sociaal-emotionele vaardigheden?

Dit proefschrift richt zich op het beantwoorden van die vraag, en wel om verschillende redenen. Kennis over de effectiviteit van individuele interventie componenten maakt het mogelijk efficiëntere interventies te ontwikkelen. Daarnaast maakt dergelijke kennis het voor professionals in de praktijk mogelijk om beter geïnformeerde beslissingen te nemen wanneer een interventie gekozen moet worden. Onderzoek naar de effectiviteit van interventies is bovendien duur en tijdrovend, en in vergelijking is onderzoek naar de effecten van individuele interventie componenten goedkoper. Tenslotte kan kennis over effectieve interventie componenten nieuwe inzichten bieden in het veranderingsmechanisme van deze interventies.

Studies in dit Proefschrift

Het onderzoek in dit proefschrift bestaat uit twee delen. In het eerste deel van dit proefschrift is door middel van een multilevel meta-analyse (**Hoofdstuk 2**) bekeken of individuele interventie componenten gerelateerd zijn aan de in nationale en internationale literatuur gerapporteerde effecten van deze interventies. We includeerden 97 gecontroleerde studies, die tezamen 60 unieke interventies gericht op sociaal-emotionele vaardigheden onderzochten onder in totaal N = 71226 kinderen van twee tot 17 jaar oud. Deze 97 studies rapporteerden in totaal 839 effect groottes. Voor de meta-analyse werden op basis van de handleidingen de afzonderlijke oefeningen van alle geïncludeerde interventies gecodeerd. Oefeningen werden gecategoriseerd in vier hoofdcategorieën: psychoeducatie (oefeningen gericht op het overbrengen van kennis over gedrag of sociale processen), psychofysieke componenten (oefeningen gericht op het verbeteren van sociaal-emotionele vaardigheden middels lichamelijke bewegingen), vaardigheidscomponenten (gericht op het oefenen van doelgedrag), en cognitief-emotionele componenten (oefeningen gericht op het begrijpen of veranderen van emoties en cognities). De resultaten van de meta-analyse lieten zien dat interventies gericht op het versterken van sociaal-emotionele vaardigheden een significant, klein effect hebben op de interpersoonlijk en emotionele vaardigheden van kinderen (d = .369, 95% CI [.292,.447], $p < .001$). Verder kwam naar voren dat interventies die psychoeducatie en het oefenen van doelgedrag bevatten grotere interventie effecten laten zien in vergelijking met interventies die deze componenten niet bevatten. Ook vonden we dat de dosis van interventie componenten uitmaakt. Om precies te zijn, laten interventies met drie tot zes psychoeducatie oefeningen en 11 tot 20 vaardigheidsoefeningen de grootste effecten zien op de interpersoonlijke en emotionele vaardigheden van kinderen. Psychofysieke oefeningen daarentegen waren niet gerelateerd aan interventie effectiviteit.

In het tweede deel van dit proefschrift werd dieper in gegaan op de effecten van individuele interventie componenten. In dit deel van het proefschrift richtten wij ons op specifieke uitkomstmaten waar veel van de huidige interventies om sociaal-emotionele vaardigheden te versterken zich op richten, en welke zeer relevant zijn voor schoolgaande kinderen: sociale en spreekangst, zelfvertrouwen en prosociaal gedrag.

De drie studies in dit deel van het proefschrift gebruikten een microtrial benadering. Een microtrial is een kortdurend, gerandomiseerd experiment waarmee onderzocht kan

worden of geïsoleerde interventie componenten leiden tot significante verbeteringen van vaardigheden en gedrag. Alle drie de microtrials onderzochten de effecten van kortdurende interventies (vier sessies van 60 minuten) die door ervaren professionals werden gegeven aan leerlingen uit de groepen 6, 7 en 8 van de deelnemende basisscholen. Verspreid over de 3 microtrials namen 54 basisscholen voor regulier onderwijs deel. Om de effecten van de interventies van elkaar te kunnen onderscheiden (en *spill-over effects* te voorkomen), konden scholen aan slechts één microtrial studie deelnemen in slechts één conditie. Kinderen met actieve toestemming voor deelname aan de respectievelijke studies vulden vier keer een vragenlijst in. Voormeting 1 vond ongeveer vijf weken voor het begin van de interventie plaats, voormeting 2 vond een week voor het begin van de interventie plaats, de nameting vond een week na afloop van de interventie plaats en de follow-up meting vond drie maanden na afloop van de interventie plaats.

Hoofdstuk 3 beschrijft een microtrial waarin de effecten van kortdurende interventies gericht op het verbeteren van sociale en spreekangst werden onderzocht. Eén interventie omvatte exposure oefeningen (blootstelling aan de angstopwekkende stimulus; n = 82, $M_{\text{leefdtijd}}$ = 10.32 jaar, SD = .95), één interventie omvatte cognitieve herstructurering (het aanpassen van niet-helpende gedachten; n = 73, $M_{\text{leefdtijd}}$ = 10.64 jaar, SD = 1.12) en één interventie bestond uit een combinatie van deze componenten (n = 36, $M_{\text{leefdtijd}}$ = 10.53 jaar, SD = 1.18). Kinderen werden uitgenodigd deel te nemen aan de interventie als zij op voormeting 1 hoger dan gemiddeld (in vergelijking met hun klasgenoten) scoorden op sociale angst. De resultaten van deze microtrial lieten zien dat zowel de interventie met exposure als de interventie met cognitieve herstructurering effect hadden op sociale angst en angst-gerelateerd gedrag van deze kinderen. De effecten voor beide interventie componenten bleven bestaan tot drie maanden na afloop van de interventies. De interventie waarin de combinatie van exposure en cognitieve herstructurering werd onderzocht bleek geen directe of follow-up effecten te hebben die groter waren dan de effecten van de individuele componenten.

Hoofdstuk 4 beschrijft een microtrial waarin de effecten van kortdurende interventies gericht op het verbeteren van zelfvertrouwen werden onderzocht. Eén interventie omvatte cognitieve herstructurering (n = 63, $M_{\text{leefdtijd}}$ = 10.69 jaar, SD = .92) en één interventie omvatte psychofysieke oefeningen (n = 60, $M_{\text{leefdtijd}}$ = 10.61 jaar, SD = 1.06), welke werden vergeleken. Beide interventies werden ook met een controlegroep vergeleken die geen interventie kreeg (n = 63, $M_{\text{leefdtijd}}$ = 10.67 jaar, SD = 1.07). Kinderen in de experimentele groepen werden uitgenodigd deel te nemen aan de interventie als zij op voormeting 1 lager dan gemiddeld (in vergelijking met hun klasgenoten) scoorden op zelfvertrouwen en assertiviteit. De resultaten van deze microtrial lieten zien dat cognitieve herstructurering bij de follow-up meting effecten had op de gedachten en het gedrag van deze kinderen: drie maanden na de interventie met cognitieve herstructurering rapporteerden kinderen meer zelfwaardering, een groter gevoel van competentie en minder negatieve gedachten vergeleken met kinderen in de controlegroep. In tegenstelling tot de interventie met cognitieve herstructurering had de interventie met psychofysieke oefeningen geen directe of follow-up effecten op zelfvertrouwen of uitkomstmaten gerelateerd aan zelfvertrouwen vergeleken met kinderen in de controlegroep.

Hoofdstuk 5 beschreef een microtrial waarin het additieve effect van een autonomie component (kinderen stimuleren op authentieke en respectvolle manier met zichzelf en anderen om te gaan) op prosociaal gedrag bij kinderen werd onderzocht. Deze microtrial week iets af van de hiervoor beschreven microtrials. Het betrof hier een universele interventie die in de klas werd gegeven, in plaats van in een subgroep kinderen met specifieke symptomen (sociale angst en weinig zelfvertrouwen). De interventies die in deze microtrial werden getoetst, richtten zich op de hele klas en bevatten zowel oefeningen om doelgedrag te oefenen als cognitief-emotionele oefeningen. Een sociaal-emotionele vaardigheden interventie met autonomie component (n = 243, $M_{leefdtijd}$ = 10.46 jaar, SD = 1.04) werd vergeleken met een sociaal-emotionele vaardigheden interventie zonder autonomie component (n = 157, $M_{leefdtijd}$ = 10.47 jaar, SD = .86) en een controlegroep die geen interventie kreeg (n = 379, $M_{leefdtijd}$ = 10.76 jaar, SD = .86). De resultaten van deze microtrial gaven aan dat de interventie gericht op het versterken van sociaal-emotionele vaardigheden met autonomie component effectiever was dan zowel de interventie zonder autonomie component als de controlegroep. Drie maanden nadat de interventie met autonomie component was afgelopen rapporteerden kinderen minder internaliserend en externaliserend gedrag vergeleken met kinderen die deelnamen aan de interventie zonder autonomie component en kinderen in de controlegroep.

Belangrijkste Conclusies

Op basis van de bevindingen van dit proefschrift komen we tot twee belangrijke conclusies. Ten eerste laat dit proefschrift zien dat niet alle componenten van interventies gericht op het versterken van sociaal-emotionele vaardigheden even goed werken. Onze bevindingen suggereren dat (i) psychoeducatie gerelateerd is aan grotere effectiviteit van interventies gericht op het versterken van sociaal-emotionele vaardigheden, (ii) psychofysieke oefeningen niet lijken bij te dragen aan het verbeteren van sociaal-emotionele vaardigheden, (iii) het oefenen van doelgedrag en cognitieve herstructurering wel bijdragen aan de sociaal-emotionele vaardigheden en gedrag van kinderen, en dat (iv) het stimuleren van de autonomie in interventies gericht op het versterken van sociaal-emotionele vaardigheden bijdraagt aan een afname van internaliserend en externaliserend probleemgedrag.

Een tweede belangrijke conclusie van dit proefschrift is dat de dosis waarin interventie componenten worden aangeboden van belang is voor de effectiviteit van interventies. Middels de meta-analyse (Hoofdstuk 2) vonden we dat specifieke dosering van interventie componenten gerelateerd waren aan optimale effecten, waarbij zowel een hogere als een lagere dosering gerelateerd was aan kleinere effecten. Wanneer we het optimale aantal oefeningen van interventie componenten naast de in de microtrials uitgevoerde interventies leggen, zien we dat de interventies waarvan het aantal interventie component oefeningen binnen de optimale range lag meer significante (gedrags)veranderingen teweeg brachten dan de interventies waarbij de dosis van interventie componenten lager dan optimaal was. Om precies te zijn lieten de exposure interventie en cognitieve herstructurering interventie gericht op het verminderen van sociale angst (Hoofdstuk 3) en de cognitieve herstructurering interventie gericht op het

vergroten van zelfvertrouwen (Hoofdstuk 4) significante resultaten zien, en deze bevatten allen voldoende vaardigheidsoefeningen en cognitief-emotionele oefeningen om effect te sorteren, zoals uit de meta-analyse naar voren kwam. Ter vergelijking vonden de interventie met de combinatie van exposure en cognitieve herstructurering gericht op het verminderen van sociale angst (Hoofdstuk 3) en de sociaal-emotionele vaardigheden interventies met en zonder de autonomie component (Hoofdstuk 5) minder positieve effecten en deze bevatten allen minder vaardigheidsoefeningen en cognitief-emotionele oefeningen dan zou worden aangeraden op basis van onze meta-analyse.

Al met al suggereren de bevindingen van dit proefschrift dat het behalen van de beoogde effecten wordt belemmerd als de dosis van interventie componenten te gering is. Het is mogelijk niet bevorderlijk voor de effectiviteit van interventies gericht op het verstreken van sociaal-emotionele vaardigheden om meerdere gedragsmatige en cognitieve aspecten tegelijkertijd aan te pakken met meerdere interventie componenten. Het onderzoek uit dit proefschrift suggereert dat het effectiever is om in interventies specifiek gedrag aan te pakken met een toereikende dosis van een specifieke interventie component.

Suggesties voor Vervolgonderzoek

Er zijn een aantal vervolgstappen te nemen om kennis en onderzoek naar effectieve componenten van interventies gericht op sociaal-emotionele vaardigheden naar het volgende niveau te tillen. Zo is het niet alleen van belang om naar inhoudelijke componenten van interventies te kijken, maar ook naar gemeenschappelijke componenten (bijvoorbeeld de therapeutische relatie) en ecologische componenten (bijvoorbeeld betrokkenheid van ouders bij de interventie). Bovendien is het van belang te weten hoe interventie componenten elkaar beïnvloeden. Vermoedelijk bestaan er combinaties van interventie componenten die een additief of synergetisch interactie effect hebben en zodoende de effectiviteit van interventies vergroten. Naast onderzoek naar *wat werkt* is het tevens van belang te achterhalen *voor wie* interventie componenten goed of juist minder goed werken. Onderzoek waarin bestaande data wordt gekoppeld (zoals met een *individual participant data* benadering) kan het effect van (combinaties van) interventie componenten voor verschillende subgroepen kinderen onderzoeken. Verder is de complexiteitsbenadering een interessant pad voor interventie onderzoek. In plaats van sociaal-emotionele vaardigheden (en de interventie componenten die zich daarop richten) te beschouwen als losstaande bouwstenen van sociaal-emotioneel gedrag, kan middels netwerk analyse het gehele gedragssysteem in kaart worden gebracht. Onderzoek naar de manier waarop psychologische variabelen samenhangen die sociale-emotionele competentie bepalen, kan informatie verschaffen over de meest centrale (en dus bepalende) variabelen in het systeem. Wanneer de centrale vaardigheden in het netwerk bekend zijn, kunnen interventie componenten gericht worden ingezet. Zo kan doormiddel van één interventie component mogelijk het gehele netwerk worden aangepakt. Potentieel zou dit interventies die meerdere interventie componenten bevatten (zoals nu vaak het geval is) zelfs overbodig maken.

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Brechtje de Mooij (Oegstgeest, 1991) received a Bachelor degree in Child and Youth Psychology at Utrecht University (2013). After this she entered the Master Forensic Child and Youth Care Sciences at the University of Amsterdam (2014-2016). Brechtje's interest in academia in general and intervention research in particular was further sparked while writing her master thesis on social-emotional skills interventions for delinquent youth and working as a research assistant at the Forensic Child and Youth Care Sciences research lab. In August 2016 she started her Ph.D. project at the Research Institute for Child Development and Education (RICDE). In her research, which was part of the ZonMw-funded project "Consortium Sociale Vaardigheden", she conducted three randomized microtrials in Dutch elementary schools. In 2018, she visited Professor John Lochman's research lab at the University of Alabama. She attended several international conferences, among which meetings of the European Association for Research on Adolescence (EARA; Ghent, 2018; Porto/Online, 2020), the Society for Research in Child Development (SRCD; Baltimore, 2019), the World Congress of Behavioral and Cognitive Therapies (WCBCT; Berlin, 2019), and the European Conference on Developmental Psychology (ECDP; Athens, 2019). Since March 2020, Brechtje works as a postdoctoral researcher at the RICDE where she continues her research into effective components of interventions. As part of this research she is training to become a Family Check-Up coach.