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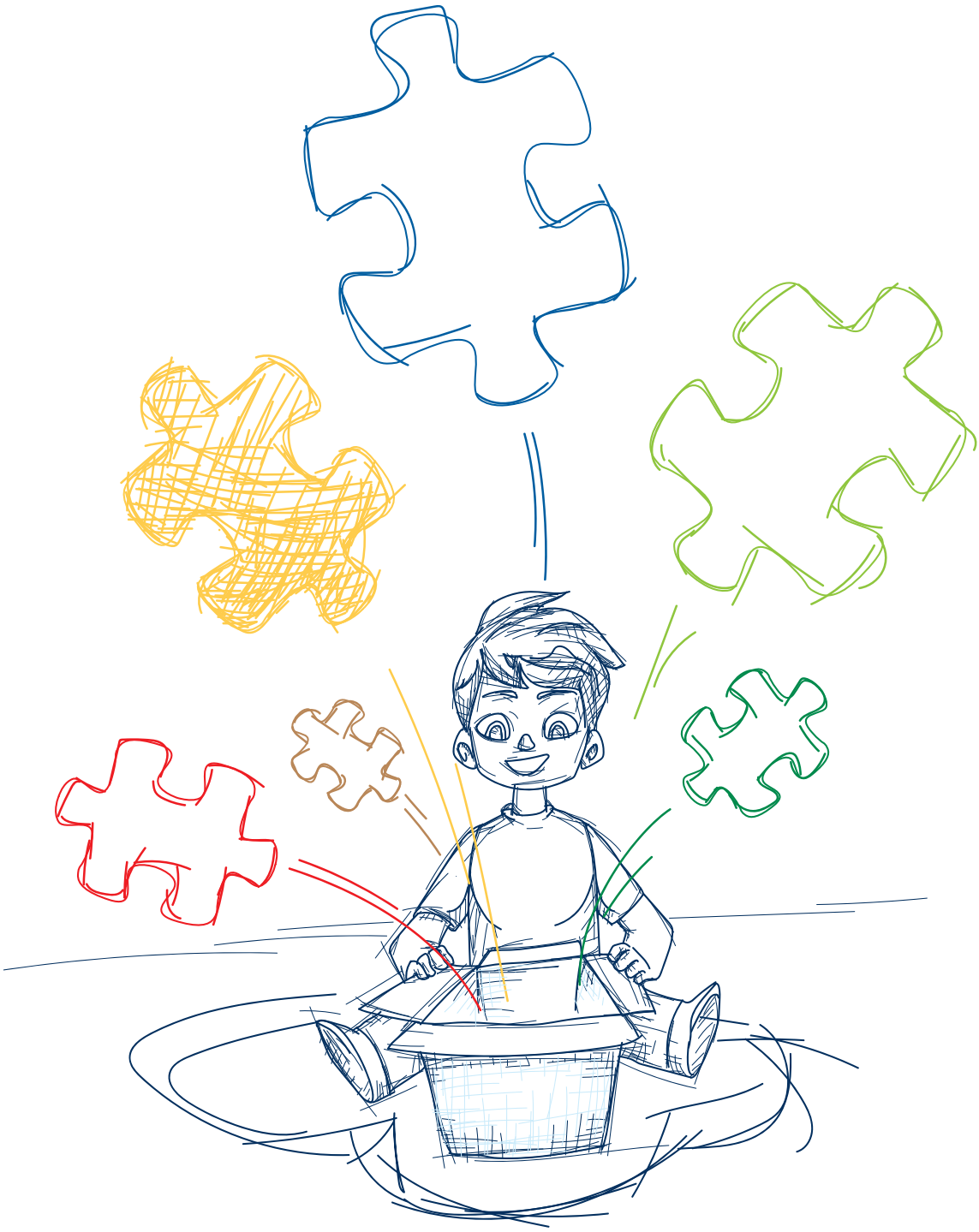

CHAPTER 4

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

Brechtje de Mooij, Minne Fekkes, Alithe L. van den Akker, Ron H. J. Scholte, Geertjan Overbeek

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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).

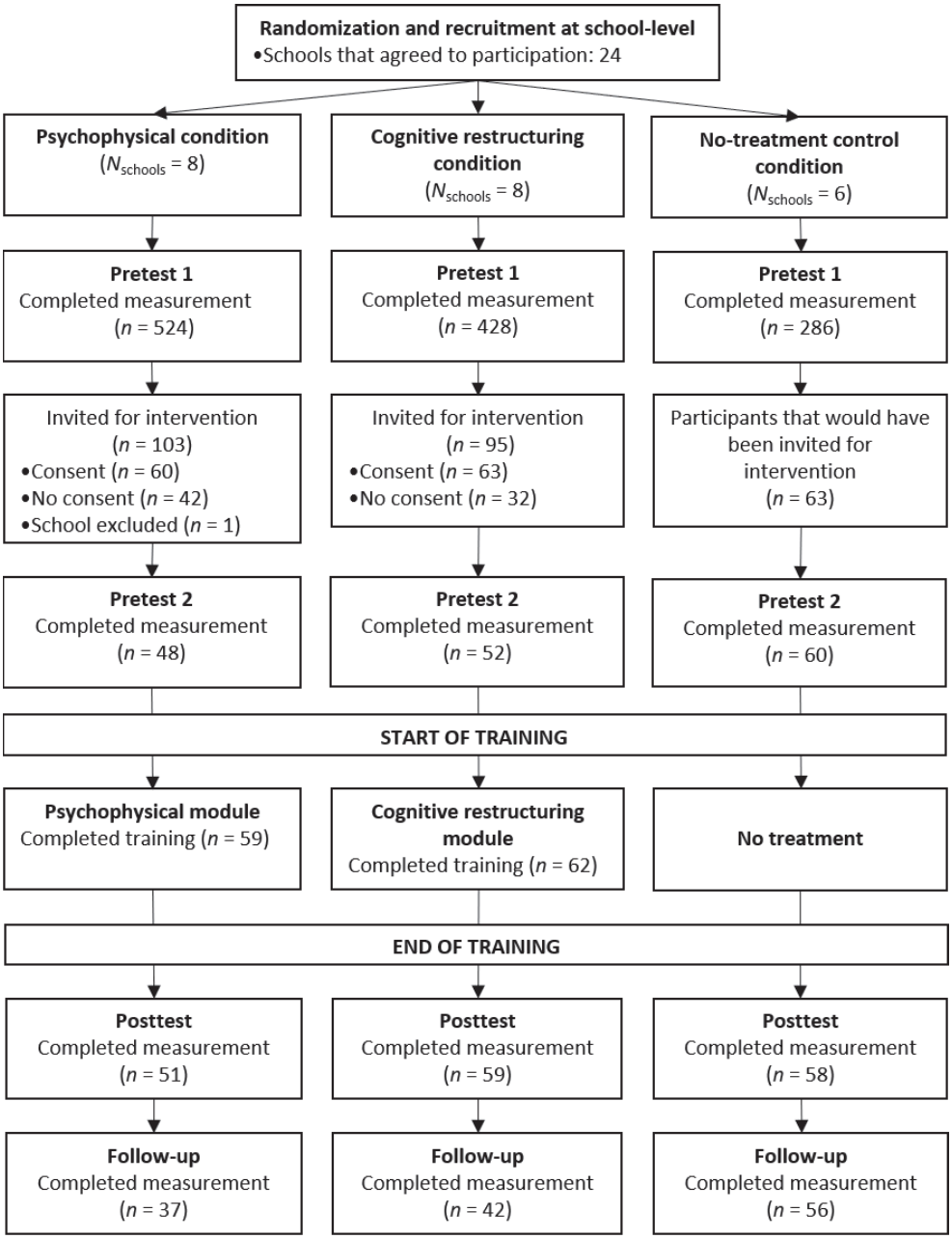
Sampling Procedure

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.