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Effectiveness of Competitive Memory Training (COMET) for low self-esteem in youth with Autism Spectrum Disorder: A randomized controlled pilot study

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Abstract

Background: Youth with ASD are at risk to develop low self-esteem, which is related to both co-occurring internalizing- and externalizing problems. In this RCT (N=24) we aimed to test the effectiveness of Competitive Memory Training (COMET) for low self-esteem in youth with ASD (8-16y).

Method: We compared the combination of COMET and Care As Usual (COMET+CAU) with CAU-only, to explore whether COMET had additional effects on low self-esteem and co-occurring symptoms of youth with ASD. Stability of effects was measured seven weeks later.

Results: Participants receiving COMET+CAU showed greater improvement on parent-reported self-esteem and externalizing symptoms than participants receiving CAU-only. Similar improvements between groups were found on self-reported self-esteem and depressive symptoms. Improvements remained stable until seven weeks after having received COMET+CAU, with depressive symptomatology improving even further.

Conclusions: Given the small sample size and mixed results, this pilot-study does not allow us to declare COMET as being necessary in enhancing low self-esteem in ASD. However, this study indicates that when given parallel to CAU, COMET can help to improve self-esteem and co-occurring externalizing problems in youth with ASD in only a short period of time.

Keywords: Autism spectrum disorders, self-esteem, treatment, cognitive behavioral therapy, youth

Introduction

Autism spectrum disorders (ASD) are pervasive neurodevelopmental disorders, affecting 1 in 160 children worldwide [1]. The core features that characterize individuals within this spectrum are deficits in social communication and interaction as well as the presence of repetitive patterns of behavior [2]. Several underlying mechanisms have been proposed that can cause individuals with ASD to process information differently from others, such as a weaker central coherence, delayed development of a Theory of Mind and difficulties in executive functioning, such as planning, inhibition and flexibility [3-7]. In addition, some individuals with ASD show difficulties in the development of active or passive language, show discrepancies between different intellectual abilities or show co-occurring motor disabilities [2]. As society greatly appeals to these functions and skills, some children and adolescents with ASD encounter challenges in their academic careers, in developing friendships or in sports [2,8]. As youth with ASD get older, they become more aware about these differences between them and their typically developing peers [9]. Being confronted with these differences might interfere with the development of a positive self-esteem [10].

Self-esteem can be defined as a global evaluation of the self by the self. It is about recognizing one's own strengths and weaknesses in different areas, resulting in an overall self-worth; which reflects self-esteem [11]. Children evaluate themselves based on comparison to others and on feedback from others [10]. In early childhood, feedback is mainly given by parents,

but as children grow older, teachers and peers get a more prominent role in children's lives and their feedback becomes more important for self-evaluation [12]. These comparisons to and feedback from others can impact their self-esteem [10, 12-13]. Facing challenges on a broad scale of domains might therefore make youth with ASD become more attentive to their shortcomings as compared to their positive characteristics and competencies, which in turn could hinder the development of a positive self-esteem.

Even though only a scarce number of studies have focused on self-esteem evaluations of youth with ASD, both parent-reports and self-reports of self-esteem showed that youth with ASD maintain a low self-esteem compared to typically developing peers. Moreover, this low self-esteem seems to be related to both co-occurring internalizing- and externalizing problems in youth with ASD [14,15]. These associations are consistent with the literature, since a low self-esteem is associated with the development of psychopathology such as depression and anxiety and overall lower well being in normative populations [16,17]. Accordingly, existing research confirms that co-occurrence of psychopathology exists among youth with ASD, with depression and anxiety being among the most common co-occurring disorders [18-20]. These co-occurring problems add to the consequences of having ASD for the child itself, their parents and their family. For example, they report lower quality of life [21], more depressive symptoms and parental stress in parents [22,23]. As ASD is a pervasive disorder and symptoms can be improved but not cured, treatment of this low self-esteem seems promising to make these children and adolescents feel better about themselves and prevent the development of co-occurring disorders.

As a low self-esteem is a common factor in disorders affecting social and emotional functioning, Competitive Memory Training (COMET) has been developed as a transdiagnostic treatment to focus solely on this concept [24]. COMET is a cognitive behavioral therapy (CBT) that uses contra-conditioning to challenge negative thoughts and feelings about the self and formulate new, more nuanced, positive ones. COMET attempts to make these alterations by reaching out to different cognitive- and affective domains within the brain, to include the whole network involved: thoughts, feelings, bodily posture, facial expressions and auditory elements [25]. So far, COMET has been found successful in enhancing self-esteem in adults within several clinical populations, among which depressive disorders [26,27], anxiety disorders [28], obsessive-compulsive disorders [29], eating disorders [30] and schizophrenia [31]. As treatments aiming on self-esteem were lacking for youth, in 2014 COMET has been adapted for treatment of children and adolescents [32].

Several changes have been made to the COMET protocol for youth, in order to make the intervention more age-appropriate [32]. The main differences are concerned with the formulation of exercises and homework: tasks and assignments are formulated more explicit, which makes it easier for children and adolescents to understand how to carry them out. For example, whereas adults are asked to activate positive emotions, children/adolescents are asked to recall a positive memory in order to activate positive emotions. The treatment protocol is only 7 individual sessions and is therefore easy to implement in mental health care for youth. A first pilot study (N=32) showed promising results in the effectiveness of COMET for improving self-esteem in children and adolescents with a low self-esteem [33]. In a non-randomized trial, the authors found pre- to posttreatment improvements in self-reported self-esteem (d=0.35-0.69), depressive symptomatology (d=0.53) and internalizing behavior (d=0.37).

So far no study has yet been conducted to assess whether COMET is also effective for enhancing low self-esteem in individuals with ASD. Moreover, in the youth protocol, the use of COMET is discouraged for individuals with ASD: it is speculated that COMET is not suitable for individuals who have difficulties with imaginary thinking. Since individuals with ASD can show problems with Theory of Mind [34], one could assume that they are less capable of such required imaginary thinking. However, the exclusion of this clinical population is not based on empirical evidence and difficulties in imaginary thinking do not imply that COMET cannot be effective for these individuals. In addition, the COMET protocol for youth solely exists of one exercise that requires imaginary skills. Other exercises are concerned with the recollection of memories, thoughts and feelings: skills that are not known to be deficient in individuals with ASD. Also, other CBT-based protocols are being used and proved to be effective for individuals with ASD [35-37].

Therefore, as there is little reason to believe that COMET is not suitable for the ASD population and at the same time treating a low self-esteem could benefit youth with ASD, the current pilot study explored the effectiveness of COMET in youth with ASD aged 8 to 16 years. We do not seek to prove COMET superior to any other intervention: as ASD is a pervasive disorder with a heterogeneous range of co-occurring problems, we do not expect COMET to be sufficient as stand-alone intervention for families with a child with ASD. Rather, we want to investigate whether COMET has additive effects to Care As Usual (CAU) on primary (self-esteem and self-worth) and secondary (co-occurring internalizing and externalizing symptoms) outcome measures when given in combination with CAU (COMET+CAU). Our two hypotheses were: 1) When given COMET+CAU, self-esteem and self-worth (primary outcome measures) of children and adolescents with ASD will improve and co-occurring internalizing and externalizing symptomatology will decrease from pretest to posttest, more than when given CAU alone; 2) Effects of COMET+CAU will remain stable or improve further to seven weeks after treatment.

Method

Trial Design

This was a multicenter (3 sites), two-arm parallel pilot study,

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with equal randomization [1:1]. Participants were recruited between February 2017 and February 2019; follow-up assessments were between June 2017 and June 2019. The study was approved by the Ethics Committee of the University of Amsterdam (2016-DP-7315) and the study was preregistered in the Clinical Trials Registration (#25615) in December 2016. No major changes were made to the trial design afterwards.

Participants and Procedure

This pilot study was advertised at participating mental health institutions. When interested, children and their parents could apply to participate. To be included in this study, children and adolescents had to meet the following criteria: (1) a diagnosis of ASD, by an independent certified psychologist or child psychiatrist based on the DSM-IV-TR or DSM-5 [2,38]. (2) a confirmation of ASD based on the Dutch Social Responsiveness Scale (SRS-2). The SRS-2 is a 65-item parent-reported questionnaire aimed at detecting interpersonal, communicative and stereotype behaviors that are typical for ASD [39]. Every item has a four-point Likert Scale (1= 'strongly agree' to 4= 'strongly disagree'), and a higher score indicates the presence of more ASD characteristics. Children were included if they reached a t-score of 61 or above, which indicates the presence of at least mild to moderate autism symptoms, (3) aged between 8 and 16 years, (4) a stated low self-esteem by the child/adolescent and/or parent, (5) a full scale IQ (FSIQ) > 80 measured by the short version of the Dutch Wechsler Intelligence Scale for Children (WISC-III) [40]. The short version consists of two subtests of the WISC-III: Block design and Vocabulary. The norm scores of these two subtests correlate highly with FSIQ [41], (6) sufficient understanding of the Dutch language by both the child and parent, (7) sufficient motivation for treatment, (8) Completion of all three assessments of this study.

Participants were excluded if: (1) severe depressive disorder with suicidal thoughts/ideations was diagnosed, and (2) the low self-esteem was due to traumatization of recent events or ongoing traumatization of past events. Based on ethical considerations, when any of these exclusion criteria was present an alternative intervention was more appropriate.

Before participation, written informed consents were acquired from all participants and their parents. The first assessment took place at baseline (T0). Due to ethical considerations all participants received COMET+CAU. To be able to compare the COMET+CAU to a CAU only condition, we divided our total sample into two conditions and counter-balanced the order of received treatments: one group first received COMET+CAU for 7 weeks (from now on called COMET+CAU condition), while the second group first received CAU-only for 7 weeks (from now on called CAU-only condition). After these 7 weeks T1 assessment took place and the COMET+CAU condition received CAU only for 7 weeks, whereas the CAU-only condition received COMET+CAU for 7 weeks (see **Figure 1** for trial design and participant flow) after which T2 assessment took place. Parent-reported questionnaires were at all time assessments completed by the primary caregiver. Allocation of the participants took place after baseline assessment, using a computer-based algorithm for equal randomization [1:1]. Interventions and assessments were all administered at the participants own outpatient mental health institute.

Thirty-two participants applied for the study, of which 28 were included based on the in- and exclusion criteria. All 28 completed baseline assessment; two participants were excluded from the study because they had FSIQ's below 80. Therefore 26 participants were randomly assigned to the two conditions.

Treatments

Competitive Memory Training (COMET)

COMET is a cognitive behavioral therapy based on Brewin's contra-conditioning principle [42]. The purpose of the intervention is to establish and strengthen new positive networks concerning thoughts and feelings about the self, in opposition to existing (negative) dysfunctional ones. Not only thoughts and feelings are involved in doing so; facial expressions and bodily postures [43], self-verbalization [44] and music [45] are also used. By involving all these different elements, successful alteration of the whole emotional network can be maintained [25]. In addition to the adult COMET protocol, positive-attention training elements are implemented into the COMET youth protocol. Focusing attention on positive experiences facilitates the construction of positive networks in children with low self-esteem [46]. Therefore, positive attention training was administered during sessions and homework, consisting of exercises meant to focus attention on positive experiences and characteristics. Homework was given after every session to generalize learned skills to daily life. At the start of each new session homework was discussed. Each individual session (of approximately 45 minutes) is focused on a main topic, summarized in **Table 1**. In one parental session, parents are taught to focus on positive elements and

Table 1. COMET session description.

Session	Treatment goal
1	Identification of automatic negative thoughts about the self
2	Finding incompatible positive thoughts and characteristics
3	Strengthening positive self-esteem by positive memories and self-verbalization
Parent	Establishing a positive environment for the child
4	Strengthening positive self-esteem by facial expression, bodily posture and music
5	Strengthening positive self-esteem by positive memories and comparison to others
6	Overcoming triggers of negative self-thought
7	Acquisition of a functional coping strategy for future challenges of self-esteem

From: Kuin & Peters, 2014.

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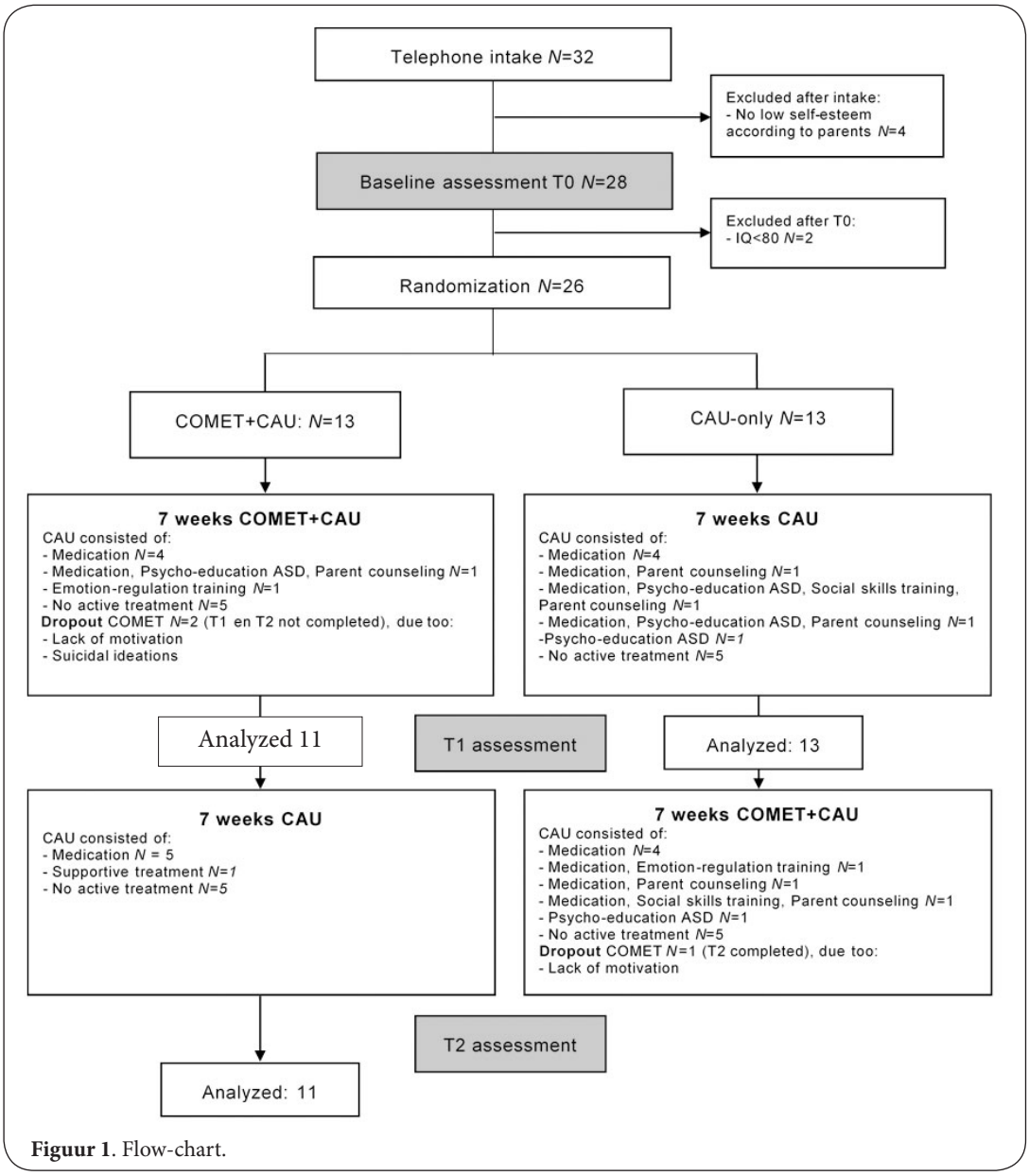

Figuur 1. Flow-chart.

behaviors of the child, to compliment the child at moments of accomplishment and to ignore negative behavior. More information on the treatment protocol can be found at the publisher [**32**].

Care As Usual

For each participant Care As Usual (CAU) was chosen and administered by their own therapist. The reason we did not decide to implement only one and the same form of CAU for all participants was primarily an ethical one: it would not be ethical to restrain participants from an intervention that would be more useful for them than the one we would have chosen. Since we are not trying to compare COMET with a specific form of CAU, neither trying to reveal COMET as stand-alone intervention as being superior to a certain CAU, there was no need to have a fixed CAU. Moreover, our goal is to see whether COMET has beneficiary effects when given parallel to whatever kind of CAU. In addition, including different CAU's in our sample allows us to be able to generalize findings to the CAU as given outside the lab setting. Interventions that were used as CAU are summarized per group in **Figure 1** and contained social skills training, emotion regulation training, psycho-education on ASD, family counseling, parent counseling and medication use. Of the 12 analyzed participants (50%) that used medication, 6 used Methylphenidate alone, 3 used Aripiprazole and Methylphenidate, 1 used Aripiprazole and Levothyroxine, 1 used Fluoxetine and Risperidone and 1 used Dexamphetamine and Risperidone.

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Outcome Measures

Primary outcome measures

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES) [47,48]. In this study three versions were used; for children between 8 and 12 the RSES-child version was administered, for adolescents between 12 and 18 the RSES-adolescent version and for parent-report on the child's self-esteem the RSES-parent version. With each questionnaire, the original questions were administered, only wording changed with informant perspective. For instance, for children items were formulated as following "*I am able to do things as well as most other* children", for adolescents "*I am able to do things as well as other* adolescents" and for parents *"My child is able to do things as well as other* children". The RSES consists of 10 items, each having a four-point Likert scale. Scores range between 10 and 40, with scores under 26 indicating a low self-esteem [49]. The RSES has previously been proven sufficiently reliable and valid [50]. It has been used in a wide range of studies concerning self-esteem [51]. In our sample, RSES reports showed a high internal consistency at all three time assessments, ranging from Cronbach's α = 0.90-0.95 for children, α = 0.84–0.93 for adolescents and α = 0.73–0.93 for parents.

Self-worth was measured using the self-worth scale of the Self Perception Profile for Children (SPPC) [52,53], a self-reported questionnaire for children aged between 8 and 12 years. For adolescents of 12 years and older, the self-worth scale of the Self Perception Profile for Adolescents (SPPA) [54,55] was used. The self-worth scale of the SPPC and SPPA contain respectively 6 and 5 items. Each item consists of two statements regarding self-esteem states (e.g. "*Some children are often disappointed in themselves, but others are almost never disappointed in themselves").* The participant has to choose what statement is most true for him/her and to what extent. Percentile scores on the subscales were calculated and computed into one new variable as to treat children and adolescent as one group in order to use for main analysis. Higher scores indicate higher perceived self-worth. In our sample, internal consistency was high for both the SPPC and the SPPA, respectively ranging from Cronbach's α=0.83–0.94 and Cronbach's α=0.74-0.90 over all 3 assessments.

Secondary outcome measures

Depressive symptoms were measured using the Child Depression Inventory (CDI): a 27-item self-reported questionnaire [56,57]. Each item consists of three statements regarding the state of mood, with each statement reflecting another score. Participants have to report what statement suits them best. For example, "*1) Sometimes I am sad, 2) Often I am sad or 3) I am always sad.*" Scores range from 0 to 54, with higher scores indicating more depressive symptoms. The CDI has previously been proven sufficiently reliable, with Cronbach's α ranging from 0.80 to 0.94 [58]. In our sample, CDI reports showed high internal consistency, ranging from Cronbach's α=0.79–0.86 over all 3 assessments.

Internalizing and externalizing problems are measured using the Child Behavior Checklist (CBCL): a 112-item parent-report questionnaire on behavioral and emotional functioning of their child [59,60]. The CBCL can be divided into two broadband scales, reflecting internalizing- and externalizing behaviors. Items contain a statement about which parents have to indicate to what extent it applies to their child, using a 3-point Likert Scale (0 = not true all, 1 = somewhat /sometimes true, 2 = often true). For example: *"Behaves too young for his/her age".* Higher scores indicate more internalizing and externalizing problems. In our sample, CBCL reports showed high internal consistency for both the internalizing and externalizing broadband scales, respectively ranging from Cronbach's α=0.88–0.90 and α=0.81–0.86 over all 3 assessments.

Therapists and Treatment Fidelity

In total, 20 therapists participated in the study, in 3 different outpatient locations. All therapists had at least a master's degree in psychology. The number of children that was treated by each therapist varied from 1 to 4.

To elevate treatment fidelity of COMET, several actions were taken: two authors (BB and MK) trained all therapist in the treatment protocol in a 3-hour training, in which they also emphasized the need for treatment fidelity. In addition, COMET is described in a treatment manual that is distributed over all treatment locations [32]. Finally, all treatments are executed using the COMET workbook to follow the same structure and order of assignments. To rate their treatment adherence, therapists were asked to fill in a registration book that asked them to rate whether they executed all assignments and whether homework was completed by the participant in the workbook as it is described in the treatment manual (yes/no). Based on these registration books, percentages of addressed elements of COMET and completion of homework assignments were calculated.

Statistical Analysis

Attrition took place in both conditions (COMET+CAU $N = 2$, CAU-only $N = 1$), due to lack of motivation ($N = 2$) and suicidal ideation ($N = 1$). Of these 3 dropouts (11.54%), one completed all assessments, leaving 24 participants for main analyses. A-priori power analysis revealed that to reach a power of 0.80, a sample size of $N = 68$ was required. However, due too low participant recruitment we unfortunately were not able to do so. The results derived from this study should therefore be interpreted with caution. All analyses in this study have been conducted with SPSS version 24.0.

First, we compared the groups on demographic characteristics at baseline using independent samples t-tests and chi-square tests, to assure successful randomization. Then we compared the groups on all outcome variables at baseline using a MANOVA, followed up by univariate tests. To test our main hypothesis, whether participants in the COMET+CAU condition improved more on primary and secondary outcome variables

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than participants in the CAU-only condition, we compared the first two measurements (T0 and T1) of both conditions on all outcome variables using a repeated measures MANOVA. To analyze our second hypothesis, whether the treatment effects for participants in the COMET+CAU condition found between T0 en T1 remain after seven weeks at T2, a paired sample t-test has been used to compare posttest to follow-up assessment. Assumptions for parametric tests were again checked for all outcome variables, and when violated, the non-parametric alternative, Wilcoxon signed-rank test, was used.

Results

Sample description and baseline comparison

Participants had a mean age of 12.00 (*SD*=2.40) years, of which 79.17% was male, with an average FSIQ of 97.92 (*SD*=12.62). Before running the main analyses, we checked whether participants differed on any demographic as well as outcome variables at baseline. Group comparisons between conditions showed no differences, indicating that any differences found hereafter cannot be attributed to these baseline characteristics. Based on the cut-off scores suggested by Isomaa et al. [**49**], observed parent-reported self-esteem and self-reported self-esteem at baseline indicate that on average, parents report a clinically low self-esteem (*M*=20.63, *SD*=4.27), whereas children indicate normative self-esteem (*M*=28.75, *SD*=6.73). Demographic and baseline descriptions are summarized in **Table 2**.

Treatment Fidelity for COMET

In the total group 88.97% completed all sessions of COMET. There were no differences (p=0.78) in the average percentage of treatment fidelity of the COMET protocol, between the COMET+CAU condition (*M*=88.24%, *SD*=7.78) and the participants in the CAU-only condition whom later received COMET (*M*=89.59%, *SD*=13.93). Likewise, 84.85% of the total group completed all homework assignments. Again, no differences (p=0.57) were found in the average percentage of homework fidelity between the COMET+CAU condition (*M*=88.43%, *SD*=27.00) and the participants in the CAU-only condition whom later received COMET (*M*=81.82%, *SD*=28.75).

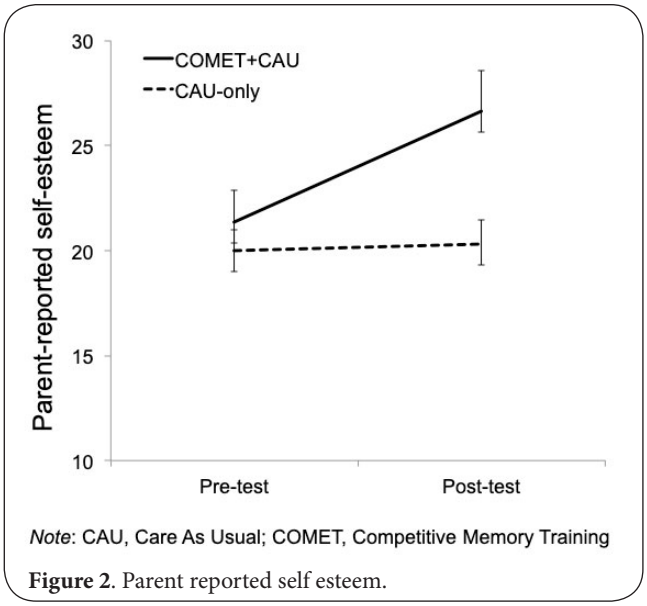
Treatment Effects

Time effects

First, the omnibus test revealed that participants in both conditions showed improvements between T0 and T1 assessments, $F(6,17)=3.05$, $p=0.03$, $\eta_p^2=0.52$. More specifically, self-reported self-esteem, parent-reported self-esteem, depressive symptomatology and externalizing symptoms improved over time regardless of condition, respectively $F(1,22)=7.96$, $p=0.01$, $\eta_p^2=0.27$, $F(1,22)=8.78$, $p<0.01$, $\eta_p^2=0.29$, $F(1,22)=10.08$, $p<0.01$, $\eta_p^2=0.31$ and $F(1,22)=4.84$, $p=0.04$, $\eta_p^2=0.18$. No significant improvements were found for feelings of self-worth (p=0.14, $\eta_p^2=0.10$) and internalizing symptoms (p=0.48, $\eta_p^2=0.02$) over time (see **Table 3** for descriptives of treatment effects).

*Time*Treatment interactions*

When comparing the two treatments on improvements between pre- and posttest, results were mixed. Parent-reported self-esteem, $F(1,22)=6.95$, $p=0.02$, $\eta_p^2=0.24$, and parent-reported externalizing symptoms, $F(1,22)=4.84$, $p=0.04$, $\eta_p^2=0.18$, showed greater improvement in the COMET+CAU group as compared to the CAU-only group (see **Figure 2**). However, improvements were similar in both groups on self-reported self-esteem (p=0.18, $\eta_p^2=0.08$) and self-reported depressive symptoms (p=0.77, $\eta_p^2 < 0.01$). And both groups showed similar lack of improvement on feelings of self-worth (p=0.19, $\eta_p^2=0.08$) and parent-reported internalizing symptoms (p=0.27, $\eta_p^2=0.06$).



Note: CAU, Care As Usual; COMET, Competitive Memory Training

Figure 2. Parent reported self esteem.

7-week follow-up

Analyses of our second hypothesis, whether the effects for participants in the COMET+CAU condition remain after seven weeks, showed maintenance of effects on primary and secondary outcome measures. Signifying that improvements of parent-reported self-esteem (p=0.43, d=0.20) and externalizing symptoms (p= 0.93, r=0.02) remained stable seven weeks after having received COMET+CAU. Self-reported depressive symptoms even decreased further after seven weeks of having received COMET+CAU, $t(1,10)=3.30$, $p<0.01$, d=0.44, but as we have no comparison to a CAU-only group at follow-up we cannot contribute this to COMET.

The improvements over time, independent of treatment allocation, found for self-worth (p=0.07, r=0.55) and internalizing symptoms (p=0.24, d=0.37) were also maintained to T2.

Discussion

This is the first study that explores treatment of low self-esteem in youth with ASD. In a pilot RCT we explored whether COMET adds to CAU in improvement of self-esteem and self-worth in youth with ASD and whether co-occurring internalizing- and

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Table 2. Sample description and group comparison at baseline.

	Total Sample (*N* = 24) *M/N (SD/%)*	**COMET+CAU condition (*N* = 11) *M/N (SD/%)***	**CAU-only condition (*N* = 13) *M/N (SD/%)***	**Group comparison**
Age in years	12.00 (2.40)	12.18 (2.39)	11.84 (2.49)	NS
N boys (%)	19 (79.17)	8 (72.72)	11 (84.62)	NS
FSIQ	97.92 (12.62)	102.82 (14.01)	93.77 (10.06)	NS
SRS T-score	75.29 (9.08)	74.64 (10.60)	75.85 (7.98)	NS
Medication (use)	12 (50.00)	5 (45.45)	7 (53.84)	NS
Childs educational level				NS
N Primary education (%)	13 (54.17)	5 (45.45)	8 (61.54)	
Secondary education				
N Low (%)	0 (0,00)	0 (0,00)	0 (0,00)	
N Average (%)	10 (41.67)	5 (45.45)	5 (38.46)	
N High (%)	1 (4.17)	1 (9.09)		
N Highest (%)	0 (0,00)	0 (0,00)	0 (0,00)	
Mother's educational level				NS
N Primary education (%)	3 (12.50)	1 (9.09)	2 (15.38)	
Secondary education				
N Low (%)	3 (12.50)	2 (18.18)	1 (7.69)	
N Average(%)	8 (33.33)	5 (45.45)	3 (23.08)	
N High(%)	9 (37.50)	3 (27.27)	6 (46.15)	
N Highest (%)	1 (4.17)		1 (7.69)	
Father's educational level				NS
N Primary education (%)	5 (20.83)	3 (27.27)	2 (15.38)	
Secondary education				
N Low (%)	8 (33.33)	3 (27.27)	5 (38.46)	
N Average (%)	8 (33.33)	3 (27.27)	5 (38.46)	
N High (%)	3 (12.50)	2 (18.18)	1 (7.69)	
N Highest (%)	0 (0,00)	0 (0,00)	0 (0,00)	
Omnibus test				NS
Self-reported self-esteem	28.75 (6.73)	30.09 (6.58)	27.62 (6.90)	NS
Parent-reported self-esteem	20.63 (4.27)	21.36 (4.99)	20.00 (3.65)	NS
Self-worth	36.33 (32.19)	43.55 (33.46)	30.23 (31.07)	NS
Depressive symptoms	14.46 (6.56)	12.82 (3.25)	15.85 (8.32)	NS
Internalizing symptoms	24.63 (10.53)	23.73 (11.83)	25.38 (9.72)	NS
Externalizing symptoms	14.63 (7.19)	12.64 (7.23)	16.31 (9.98)	NS

externalizing symptoms would decrease in accordance. Our results showed that the combination COMET+CAU caused greater improvement than CAU only in parent-reported self-esteem and co-occurring externalizing problems with large effect sizes. Self-reported self-esteem and depressive symptoms improved equally in both groups, and self-worth and parent-reported internalizing symptoms did not improve. All improvements remained stable to follow-up 7 weeks after treatment, with depression improving even further.

This pilot study supports that youth with ASD can benefit from psycho-social treatment [35-37] and also shows small additive effects of COMET as compared to CAU-only. However, these additional effects were mainly reported by parents (on their child's self-esteem and externalizing symptoms). Based on cut-off scores of a large Finnish sample of 15-year olds, in this study 75% of the participants had a clinical low self-esteem according to parent-reports, while only 25% self-reported a clinical low self-esteem [49]. Hence, there was actually little to no room for improvement from the child's perspective. Still, parents do seem to remark improvements and this can be very valuable for both parents and child. Low self-esteem and co-occurring symptoms do not only affect the child, but also parents and the family, as is seen in a lower quality of life, higher parenting stress and more depressive symptoms

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Table 3. Group comparison of pre- to posttreatment improvements on primary and secondary outcome measures between COMET+CAU and CAU-only.

	COMET+CAU *N*=11		CAU-only *N*=13		Time effects		Time*Treatment effects	
	T0 *M (SD)*	T1 *M (SD)*	T0 *M (SD)*	T1 *M (SD)*	*p*	η_p^2	*p*	η_p^2
Omnibus test					0.03	0.52	0.14	0.40
Self-reported self-esteem	30.09 (6.58)	34.18 (6.79)	27.62 (6.90)	29.00 (7.52)	0.01	0.27	0.18	0.08
Parent-reported self-esteem	21.36 (4.99)	26.64 (6.41)	20.00 (3.65)	20.31 (4.23)	≤0.01	0.29	0.02	0.24
Self-worth	43.55 (33.46)	63.55 (31.79)	30.23 (31.07)	31.46 (32.01)	0.14	0.10	0.19	0.08
Depressive symptoms	12.82 (3.25)	9.82 (5.38)	15.85 (8.32)	12.23 (8.42)	≤0.01	0.31	0.77	≤0.01
Internalizing symptoms	23.73 (11.83)	21.27 (10.89)	25.38 (9.72)	25.92 (9.94)	0.48	0.02	0.27	0.06
Externalizing symptoms	12.64 (7.23)	9.09 (3.27)	16.31 (6.98)	16.31 (8.24)	0.04	0.18	0.04	0.18

Note: COMET, Competitive Memory Training; CAU, Care As Usual, ηp2 = Partial Eta Squared: 0.01 = small, 0.06 = medium, 0.14 = large.

in these parents [21-23]. So, when parents notice their child to have a more positive self-esteem and less externalizing symptoms the stress perceived in parenting might diminish and parent-child interactions may improve, which in turn can initiate positive effects on child functioning and even self-perceived self-esteem.

Still, the informant-discrepancy found in this study is remarkable. One might argue that differences in perspectives could be explained by the lack of ability for youth with ASD to report on self-questionnaires, since critical self-reflection is needed to do so. However, the self-reports did have high internal consistency over all three assessments, indicating that the informant-discrepancy can not be attributed to low reliability of self-reports [14]. Yet, it might be possible that the questionnaires used in this study are not sensitive for youth with ASD. Knowing that some children with ASD have difficulties with abstract reasoning and self-evaluations in particular, the validity of the instruments can be questioned [61-63]. Still, De Los Reyes and Kazdin [64] mention in their work that informant discrepancies should not be only interpreted as methodological error, but rather should be used to try to understand the nature of parent-child interactions and how this in turn can affect child functioning and behavior. Therefore we advise the use of both self- and parent-reported self-esteem and co-occurring symptoms, as both perspectives are important for assessment of treatment effects.

Another explanation, for not finding additional effects of COMET+CAU on self-reported self-esteem and depressive symptoms, are the characteristics of our comparison group. Although COMET has been specially designed to tackle low self-esteem and self-worth, CAU can be client-adjusted; meaning that in these particular cases CAU could already be, as much as COMET, focused on enhancing low self-esteem and self-worth and also internalizing symptoms. When CAU is already a suitable intervention, it is not surprising that no additional effects could be found. Another explanation could be the presence of a so called "waiting-list effect": participants in the CAU-only condition knew in advance that they would receive COMET+CAU after 7 weeks of CAU-only. A recent study showed that the expectancy of receiving psychotherapy for depression in the near future already caused depressive symptoms to decrease before therapy was induced [65]. This could explain the improvements in self-esteem and depressive symptoms in the CAU-only group.

Based on our results, there is no reason to withhold COMET from youth with ASD. Participants showed high treatment fidelity and additive improvements are present in self-esteem and co-occurring externalizing symptoms. Possibly COMET could have an even greater effect when 1) made more client tailored: in the same way CAU can be adjusted to the particular needs of the client and 2) treatment is pro-longed. COMET in its current form is a relatively short CBT of only 7 sessions. Possibly a greater intensity of treatment (e.g. more sessions, longer sessions or more involvement of parents) is needed to enhance its effects in youth with ASD. It could take more time than 7 weeks to internalize treatment and practice newly learned skills to generalize into daily life. The improvement of depressive symptoms during the follow-up period could be an example thereof.

A limitation of this study, and at the same time another explanation for the lack of additional effects of COMET in this study, is the lack of statistical power. Despite active recruitment of participants, we did not reach the required sample size for this study. Results should therefore be interpreted with caution. Looking at the effect sizes in this study, it could be speculated that additional effects of COMET might be present but could not be revealed due to our small sample size. Hence, it is necessary to replicate this pilot study in a larger randomized controlled trial with a power of at least .80 with a longer follow-up period, so that existing effects can be revealed. An other short-coming of this study was the lack of control on the administration and stability of CAU.

Conclusion

Taken together, this was the first randomized controlled study looking at the effectiveness of COMET when added to CAU

for improving low self-esteem in youth with ASD. The results of this pilot-study are hopeful, as only 7 weeks of treatment caused significantly greater improvements in parent-reported self-esteem and co-occurring externalizing problems in youth with ASD. These results also support earlier found associations between low self-esteem and externalizing problems in youth with ASD [**15**] and suggest that treatment of self-esteem might also alleviate these externalizing problems. The results of this pilot-study do not allow us to declare COMET as being necessary in enhancing low self-esteem in ASD, but we can suggest that when given parallel to CAU, COMET helps to improve self-esteem and co-occurring externalizing problems in youth with ASD in only a short period of time.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	SB	MK	BEB
Research concept and design	--	√	√
Collection and/or assembly of data	√	√	--
Data analysis and interpretation	√	√	--
Writing the article	√	√	√
Critical revision of the article	--	--	√
Final approval of article	√	--	--
Statistical analysis	√	√	√

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References

1. World Health Organization (2017). Autism spectrum disorders, 4 April 2017. https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders.
2. American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (5th edition). Washington, DC: American Psychiatric Association.
3. Frith, U. (2003). Autism: Explaining the enigma (2nd ed.). Malden: Blackwell Publishing
4. Freeman, L. M., Locke, J., Rotheram-Fuller, E., & Mandell, D. (2017). Brief report: Examining executive and social functioning in elementary-aged children with autism. *Journal of Autism and Developmental Disorders,* 47(6), 1890-1895. doi: 10.1007/s10803-017-3079-3.
5. Ozonoff, S. & Jensen, J. (1999). Specific executive function profiles in three neurodevelopmental disorders. Journal of Autism and Developmental Disorders, 29(2), 171-177. http://dx.doi.org/10.1023/A:1023052913110
6. Ozonoff, S., Strayer, D. L., McMahon, W. M., & Filloux, F. (1994). Executive function abilities in autism and tourette syndrome: An information processing approach. The Journal of Child Psychology and Psychiatry, 35(6), 1015-1032. http://dx.doi.org/10.1111/j.1469-7610.1994.tb01807.x
7. Schuh, J. M., & Eigsti, I. (2012). Working memory, language skills, and autism symptomatology. Behavorial Sciences, 2(4), 207-218. doi: 10.3390/bs2040207
8. Estes, A., Rivera, V., Bryan, M., Cali, P., & Dawson, G. (2011). Discrepancies between academic achievement and intellectual ability in higher-functioning school-aged children with autism spectrum disorder. Journal of Autism and Developmental Disorders, 41(8), 1044–1052. http://doi.org/10.1007/s10803-010-1127-3.
9. Portway, S., & Johnson, B. (2003). Asperger syndrome and the children who "Don"t quite fit in'. Early Child Development and Care, 173(4), 435–443. https://doi.org/10.1080/0300443032000079113
10. Mann, M., Hosman, C. M. H., Schaalma, H. P., & de Vries, N. K. (2004). Self-esteem in a broad-spectrum approach for mental health promotion. Health Education Research, 19(4), 357–372. doi: 10.1093/her/cyg041
11. Harter, S., Waters, P., & Whitesell, N. R. (1998). Relational self-worth: Differences in perceived worth as a person across interpersonal contexts among Adolescents. Child Development, 69(3), 756-766. doi: 10.1111/j.1467-8624.1998.tb06241.x
12. Harter, S. (2012). The construction of the self. New York, NY: Guilford Press.
13. Westenberg, P. M., Drewes, M. J., Goedhart, A. W., Siebelink, B. M., & Treffers, P. D. (2004). A developmental analysis of self-reported fears in late childhood through mid-adolescence: Social-evaluative fears on the rise? Journal of Child Psychology and Psychiatry, 45(3), 481-495. https://doi.org/10.1111/j.1469-7610.2004.00239.x
14. McCauley, J. B., Harris, M. A., Zajic, M. C., Swain-Lerro, L. E., Oswald, T., McIntyre, N., Trzesniewski, K., Mundy, P., & Solomon, M. (2017). Self-esteem, internalizing symptoms, and Theory of Mind in youth with autism spectrum disorder. Journal of Clinical Child and Adolescent Psychology, 00(00), 1-12. doi: 10.1080/15374416.2017.1381912.
15. Van der Cruijsen, R. & Boyer, B. E. (*under review*). Implicit and explicit self-esteem in youth with Autism Spectrum Disorders. Manuscript submitted for publication.
16. Hawker, D. S., & Boulton, M. J. (2000). Twenty years ' research on peer victimization and psychosocial maladjustment : A meta-analytic review of cross-sectional studies. The Journal of Child Psychology and Psychiatry, 41(4), 441-455. doi: 10.1111/1469-7610.00629
17. Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. Psychological Bulletin, 139(1), 213-240. doi: 10.1037/a0028931
18. Matson, J. L., & Nebel-Schwalm, M. S. (2007). Comorbid psychopathology with autism spectrum disorder in children: An overview. Research in Developmental Disabilities, 28(4), 341-352. doi: 10.1016/j.ridd.2005.12.004
19. Simonoff, E., Pickels, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity, and associated factors in a population-derived sample. Journal of the American Academy of Child and Adolescent Psychiatry, 47(8), 921-929. doi: 10.1097/CHI.0b013e318179964f.
20. White, S. W., Oswald, D., Ollendick, T., & Scahill, L. (2009). Anxiety in children and adolescents with autism spectrum disorders. Clinical Psychology Review, 29(3), 216-229. doi: 10.1016/j.cpr.2009.01.003.
21. Broquere, M., Soussana, M., Michelon, C., Rattaz, C., Brisot, J., & Baghdadli, A. (2016). Impact of anxiety disorders on quality of life of adolescents with autism spectrum disorder without intellectual disability. L'Encephale, 42(6), 499-505. doi: 10.1016/j.encep.2015.12.025
22. Lee, L. C., Harrington, R. A., Louie, B. B., & Newschaffer, C. J. (2008). Children with autism: Quality of life and parental concerns. Journal of autism and developmental disorders, 38(6), 1147-1160. doi: 10.1007/s10803-007-0491-0
23. Van Steijn, D. J., Oerlemans, A. M., Van Aken, M. A., Buitelaar, J. K., & Rommelse, N. N. (2014). The reciprocal relationship of ASD,

ADHD, depressive symptoms and stress in parents of children with ASD and/or ADHD. Journal of autism and developmental disorders, 44(5), 1064-1076. doi: 10.1007/s10803-013-1958-9

24. Korrelboom, K., Van der Weele, K., Gjaltema, M., & Hoogstraten, C. (2009). Competitive Memory Training for treating low self-esteem: A pilot study in a routine clinical setting. The Behavior Therapist, 32(1), 3-8. doi: https://doi.org/10.1017/S1352465810000469
25. Lang, P. J. (1985). The cognitive psychophysiology of emotion: Fear and anxiety. In A. H. Tuma, & J. Maser (Eds.), Anxiety and the anxiety disorders (pp. 131-171). Hillsdale, New Jersey, London: Lawrence Erlbaum Associates, Publishers.
26. Ekkers, W., Korrelboom, K., Huijbrechts, I., Smits, N., Cuijpers, P., & van der Gaag, M. (2011). Competitive Memory Training for treating depression and rumination in depressed older adults: A randomized controlled trial. Behaviour Research and Therapy, 49(10), 588-596. doi: 10.1016/j.brat.2011.05.010.
27. Korrelboom, K., Maarsingh, M., & Huijbrechts, I. (2012). Competitive Memory Training (COMET) for treating low self-esteem in patients with depressive disorders: A randomized clinical trial. Depression and Anxiety, 29(2), 102-110. doi: 10.1002/da.20921.
28. Staring, A. B. P., van den Berg, D. P. G., Cath, D. C., Schoorl, M., Engelhard, I. M., & Korrelboom, K. (2016). Self-esteem treatment in anxiety: A randomized controlled crossover trial of Eye Movement Desensitization and Reprocessing (EMDR) versus Competitive Memory Training (COMET) in patients with anxiety disorders. Behaviour Research and Therapy, 82, 11-20. doi: 10.1016/j.brat.2016.04.002.
29. Schneider, B. C., Wittekind, C. E., Talhof, A., Korrelboom, K., & Moritz, S. (2015). Competitive Memory Training (COMET) for OCD: A self-treatment approach to obsessions. Cognitive Behaviour Therapy, 44(2), 142-152. doi: 10.1080/16506073.2014.981758
30. Korrelboom, K., De Jong M., Huijbrechts, I., & Daansen, P. (2009). Competitive Memory Training (COMET) for treating low self-esteem in patients with eating disorders: A randomized clinical trial. Journal of Consulting and Clinical Psychology, 77(5), 974-980. doi: 10.1037/a0016742.
31. Van der Gaag, M., Van Oosterhout, B., Daalman, K., Sommer, I. E., & Korrelboom, K. (2012). Initial evaluation of the effects competitive memory training (COMET) on depression in schizophrenia-spectrum patients with persistent auditory verbal hallucinations: A randomized controlled trial. The British Journal of Clinical Psychology, 52(2), 158-171. doi: 10.1111/j.2044-8260.2011.02025.x.
32. Kuin, M., & Peters, P. (2014). Zelfbeeldtraining voor kinderen en jongeren: Competitive Memory Training (COMET). Houten Bohn Stafleu van Loghum.
33. Kuin, M., Peters, P., Galesloot, E., Van Steensel, B., & Bögels, S. (in preparation.) The effectiveness of a self-esteem training for children and adolescents. Manuscript submitted for publication.
34. Baron-Cohen, S. (1995). Mindblindness: An essay on autism and theory of mind. Cambridge, MA: MIT Press
35. Lang, R., Regester, A., Lauderdale, S., Ashbaugh, K., & Haring, A. (2010). Treatment of anxiety in autism spectrum disorders using cognitive behaviour therapy: A systematic review. Developmental Neurorehabilitation, 13(1), 53-63. doi: 10.3109/17518420903236288
36. Sukhodolsky, D. G., Bloch, M. H., Panza, K. E., & Reichow, B. (2013). Cognitive-behavioral therapy for anxiety in children with high-functioning autism: A meta-analysis. Pediatrics, 132(5), 1341-1350. doi: 10.1542/peds.2013-1193.
37. Weston, L., Hodgekins, J., & Langdon, P. E. (2016). Effectiveness of cognitive behavioral therapy with people who have autistic spectrum disorders: A systematic review and meta-analysis. Clinical Psychology Review, 49, 41-54. doi: 10.1016/j.cpr.2016.08.001.
38. American Psychiatric Association (2000). Diagnostic and statistical manual of mental disorders (4th edition Text-Revision). Washington, DC: American Psychiatric Association.
39. Roeyers, H., Thys, M., Druart, C., De Schrijver, M., & Schittekatte, M. (2011). SRS -2 Screeningslijst voor autismespectrumstoornissen. Amsterdam: Hogrefe Uitgevers BV.
40. Kort, W., Schittekatte, M., Bosmans, M., Compaan, E., Vermeir, G., & Verhaeghe, P. (2005). Wechsler Intelligence Scale for Children-III: Handleiding. Amsterdam: Pearson.
41. Sattler, J. M. (2001). Assessment of Children: Cognitive Applications (4th edition). San Diego, CA.
42. Brewin, C.R. (2006). Understanding cognitive behaviour therapy: A retrieval competition account. *Behaviour Research and Therapy, 44*(6), 765–784. doi: 10.1016/j.brat.2006.02.005
43. Holmes, E. A., Mathews, A., Mackintosh, B., & Dalgleish, T. (2006). The causal effect of mental imagery on emotion assessed using picture–word cues. Emotion, 8(3), 395–409. doi: 10.1037/1528-3542.8.3.395.
44. Posthuma, D., & Lange, A. (1999). Positieve zelfverbalisatie bij opgenomen patiënten: Een pilot-onderzoek. Directieve Therapie, 19(3), 51–57. doi:10.1007/BF03060211
45. Van der Does, W. (2002). Different types of experimentally induced sad mood? Behavior Therapy, 33(4), 551-561. https://doi.org/10.1016/S0005-7894(02)80016-8
46. Reijntjes, A., Thomaes, S, Kamphuis, J. H., Orobio de Castro, B., & Telch, M. J. (2010). Self-verification strivings in children holding negative self-views: The mitigating effects of a preceding success experience. Cognitive Therapy and Research, 34(6), 563–570. doi: 10.1007/s10608-009-9289-z
47. Rosenberg, M. (1979). Components of Rosenberg's self-esteem scale. Conceiving the self. New York: Basic Books.
48. Everaert, J., Koster, E. H. W., Schacht, R., & De Raedt, R. (2010). Evaluatie van de psychometrische eigenschappen van de Rosenberg zelfwaardeschaal in een poliklinische psychiatrische populatie. Gedragstherapie, 43(4), 307-317.
49. Isomaa, R., Väänänen, J., Fjörd, S., Kaltiala-Heino, & R., Marttunen, M. (2013). How low is low? Low self-esteem as an indicator of internalizing psychopathology in adolescence. *Health Education & Behavior, 40*(4), 392-399. doi: https://doi.org/10.1177/1090198112445481
50. Blascovich, J., & Tomaka, J. (1991). Measures of self-esteem. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of social psychological attitudes, Vol. 1. Measures of personality and social psychological attitudes* (pp. 115-160). San Diego, CA, US: Academic Press.
51. Schmitt, D. P., & Allik, J. (2005). Simultaneous administration of the Rosenberg Self-Esteem Scale in 53 Nations: Exploring the universal and culture-specific features of global self-esteem. Journal of Personality and Social Psychology, 89(4), 623-642. doi:10.1037/0022-3514.89.4.623
52. Harter, S. (1985). Manual for the self-perception profile for children. Denver, CO: University of Denver.
53. Veerman, J. W., Straathof, M. A. E., Treffers, A., Van den Bergh, B. R. H., & Ten Brink, L. T. (1997). Competentiebelevingsschaal voor Kinderen (CBSK): Handleiding. Lisse: Swets & Zeitlinger
54. Harter, S. (1988). Manual for the self-perception profile for adolescents. Denver, CO: University of Denver
55. Treffers, A., Goedhart, A. W., Veerman, J. W., Van den Bergh, B. R. H., Ackaert, L., & De Rycke, L. (2002). Competentie Belevings-Schaal voor Adolescenten. Handleiding. Lisse: Swets Test Publishers.
56. Sitarenios, G., & Kovacs, M. (1999). Use of the Children's Depression Inventory. In M. E. Maruish (Ed.), The use of psychological testing for treatment planning and outcomes assessment (pp. 267-298). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.
57. Timbremont, B., & Braet, C. (2008). Children's Depression Inventory Handleiding. Amsterdam: Pearson.
58. Saylor, C. F., Finch, A. J., Spirito, A., & Bennett, B. (1984). The Children's Depression Inventory: A systematic evaluation of psychometric properties. *Journal of Consulting and Clinical Psychology, 52*(6), 955–967. https://doi.org/10.1037/0022-006X.52.6.955
59. Achenbach, T. M. (1994). Child Behavior Checklist and related instruments. In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcome assessment* (pp. 517–549). Hillsdale: Lawrence Erlbaum Associates, Inc.
60. Verhulst, F. C., Van der Ende, J., & Koot, H. M. (1996). Handleiding voor de CBCL 4-18 (Nederlandse versie). Rotterdam: Afdeling Kinder- en Jeugdpsychiatrie, Sophia Kinderziekenhuis/Academisch Ziekenhuis/

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61. Henderson, H. A., Zahka, N. E., Kojkowski, N. M., Inge, A. P., Schwartz, C. B., Hilleman, C. M., Coman, D. C., & Mundy, P. C. (2009). Self-referenced memory, social cognition, and symptom presentation in autism. Journal of Child Psychology and Psychiatry, 50(7), 853-861. doi: 10.1111/j.1469-7610.2008.02059.x.
62. Lombardo, M. V., Barnes, J. L., Wheelwright, S. J., & Baron-Cohen, S. (2007). Self-referential cognition and empathy in autism. PLoS One, 2(9), e883. doi: 10.1371/journal.pone.0000883.
63. Toichi, M., Kamio, Y., Okada, T., Sakihama, M., Youngstrom, E. A., Findling, R. L., & Yamamoto, K. (2002). A lack of self-consciousness in autism. American Journal of Psychiatry, 159(8), 1422-1424. doi: 10.1176/appi.ajp.159.8.1422
64. De Los Reyes, A., & Kazdin, A. E. (2005). Informant discrepancies in assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. Psychological Bulletin, 131(4), 482-509. doi:10.1037/0033-2909.131.4.483
65. Ahola, P., Joensuu, M., Knekt, P., Lindfors, O., Saarinen, P., Tolmunen, T., Valkonen-Korhonen, M., Jääskeläinen, T., Virtala, E., Tiihonen, J., & Lehtonen, J. (2017). Effects of scheduled waiting for psychotherapy in patients with major depression. *Journal of Nervous and Mental Disease, 205*(8), 611-617. doi: 10.1097/NMD.0000000000000616.

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