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## A meta-analysis on the outcomes of adolescents at risk for school drop-out attending nonresidential alternative educational facilities

Sanne Pronk<sup>a,b,c</sup> , Chris Kuiper<sup>c,d</sup>, Dafne Smit<sup>c,e</sup>, Geert Jan Stams<sup>b</sup>, Arne Popma<sup>f</sup>, Eva Mulder<sup>f</sup> , and Germie van den Berg<sup>g</sup>

<sup>a</sup>Altra Education and Youth Care, Amsterdam, Netherlands; <sup>b</sup>Department of Child Development and Education, University of Amsterdam, Amsterdam, Netherlands; <sup>c</sup>Ihub, Amsterdam, Netherlands; <sup>d</sup>Horizon Youth Care and Special Education, Rotterdam, Netherlands; <sup>e</sup>Altra Education and Youth Care, Amsterdam, Netherlands; <sup>f</sup>Department of Child and Adolescent Psychiatry, Amsterdam UMC, VU Medical Center, Amsterdam, Netherlands; <sup>g</sup>Netherlands Youth Institute, Utrecht, Netherlands

### ABSTRACT

In this multilevel meta-analysis the outcomes of adolescents with complex problems at risk for school drop-out attending nonresidential alternative educational facilities were examined. Ten studies (87 effect sizes), examining outcomes on social-emotional functioning, academic achievement, academic attitude, externalizing and internalizing problems, were included. The findings indicated a small but significant overall effect ( $d = 0.15$ ,  $p = .03$ ), providing preliminary evidence that these facilities may be associated with positive outcomes for adolescents. Study quality, measurement type and reliability of the assessment instruments were significant moderators of the overall effect size. Results of this study urge for more high quality research on nonresidential alternative educational facilities, because they can contribute to positive youth outcomes, which in turn may prevent school drop-out and other negative life outcomes.

### KEYWORDS

Adolescent functioning; alternative education; meta-analysis; nonresidential; school drop-out

Alternative educational facilities provide care and education for adolescents with complex problems who temporarily cannot attend regular (i.e., general) education. Alternative education includes all kinds of non-regular educational programs, ranging from extra support or unique classes in regular schools to alternative education delivered in residential (forensic) facilities (Aron, 2003; Henrich, 2005; Raywid, 1999; Te Riele, 2007). Research on alternative education is accumulating (e.g., Klima, Miller, & Nunlist, 2009; Wilson, Tanner-Smith, Lipsey, Steinka-Fry, & Morrison, 2011). However, the variety of populations and contexts in which alternative education is applied, including both residential and nonresidential facilities, makes comparisons of results among studies difficult. Also, research on the outcomes of adolescents attending alternative educational facilities did not yield consistent results (Aron & Zweig, 2003; Cox, Davidson, & Bynum, 1995; Klima et al., 2009; Wilson et al., 2011; Wilson & Lipsey, 2007).

To date, there is no systematic quantitative review of the outcomes of adolescents in nonresidential alternative educational facilities, which aim to increase positive youth outcomes (e.g., behavioral, social-emotional functioning and academic achievement) and prevent school drop-out, thereby possibly preventing a path toward (residential) out-of-home placement and other negative life outcomes (e.g., unemployment, involvement in the criminal justice system). Therefore, the present meta-analysis examines the outcomes of adolescents with emotional and behavioral problems who

are at risk for school drop-out attending nonresidential alternative educational facilities.

### Adolescents with complex problems

Adolescents with complex problems often struggle to successfully complete their educational trajectories. Lack of social-emotional skills, internalizing as well as externalizing problem behavior, a negative attitude toward school and low academic achievement are risk factors that impair their school success, including grade retention, suspension, expulsion or school drop-out (Landrum, Tankersley, & Kauffman, 2003; Wagner & Cameto, 2004; Zolkoski, Bullock, & Gable, 2016). Moreover, academic failure and school drop-out have been identified as key elements in the “school to prison pipeline” (Christle, Jolivet, & Nelson, 2005).

### Alternative educational facilities

Adolescents with complex problems often attend alternative educational facilities due to behavior that makes positive functioning in a regular school setting difficult, or due to court adjudication (Flower, McDaniel, & Jolivet, 2011). The main goal of professionals in alternative educational facilities is to prevent school drop-out and a path of negative life outcomes by providing a more structured and nurturing environment in order to diminish emotional, behavioral and/or

academic problems (Deeds & DePaoli, 2017). The integration of efforts to promote emotional, social (behavioral) and academic learning is promising (Zins, Bloodworth, Weissberg, & Walberg, 2007). To prevent school drop-out, programs in alternative educational facilities should be focused on academic achievement to ensure these adolescents catch up or keep up with their same-grade peers in regular schools, as well as on building skills and promoting behaviors essential for learning and social functioning (Landrum et al., 2003), such as reducing externalizing and internalizing problem behavior and increasing positive social-emotional functioning and a positive academic attitude.

For many years, adolescents with complex problems were mainly served in residential settings and juvenile justice settings, often thought to be a “last chance” experience (Flower et al., 2011). Concern about the human and financial costs (Tobin & Sprague, 2000), the growing evidence of the minimal success of restrictive settings (Powers, Bierman, & Coffman, 2016), and legislation which mandates students to be educated in the least restrictive environment (IDEA., 2004; UN General Assembly, 1989) has stimulated interest in the development of less restrictive alternative educational settings, shifting attention toward nonresidential, innovative academic programs (Kochhar-Bryant, 2002).

### Program elements within alternative education

By the time that adolescents with complex problems attend alternative educational facilities, it is likely that they have experienced a significant level of failure, exclusion, and punitive measures. The use of effective strategies is required to achieve positive outcomes for these adolescents (Flower et al., 2011). Frequently mentioned effective program elements for alternative educational facilities are low ratios of students to teachers, highly structured classroom management, positive behavior management, functional behavioral assessments, social skills instruction, implementation of a positive behavioral interventions and supports (PBIS) framework, effective academic instructional strategies, setting high yet achievable expectations, continuous monitoring of student performance, adult mentors at school and involvement of parents and community (Christle et al., 2005; Landrum et al., 2003; Maillet, 2017; Nelson, Sprague, Jolivette, Smith, & Tobin, 2009; Tobin & Sprague, 2000; Zolkoski et al., 2016). Last, the temporary character of placements in alternative educational facilities makes support during and after transition back to regular schools important (Aron & Zweig, 2003; Wald & Losen, 2003).

### Objectives of this study

The number of nonresidential alternative educational facilities rises, while a systematic quantitative review of outcomes and effective program elements is still lacking. In this meta-analysis we integrate studies on the outcomes of adolescents with complex problems at risk for school drop-out attending nonresidential alternative educational facilities. We focus only on nonresidential facilities, which serve adolescents on

a temporary basis with the focus on preventing school drop-out and returning them to regular schools. Outcomes in various domains of adolescent functioning will be examined, accounting for both within and between study differences through moderator analyses of sample characteristics, program elements, study design and outcomes.

## Method

### Sample of studies

In the current multilevel meta-analysis, studies published in English-written peer-reviewed journals between 1995 and 2017 addressing the outcomes of adolescents with complex problems who are at risk for school drop-out and attended nonresidential alternative educational facilities all over the world, were included. Cox and colleagues conducted a somewhat similar meta-analysis in 1995, and studies before that time might be less relevant due to changes in society and educational and care systems. Based on these two facts we have made the pragmatic choice to only include studies from 1995 on.

Articles were found by using the following databases: ERIC, PsycINFO and Google Scholar. The search string included a combination of the following elements: an element describing the facility, the population, the outcome domain and the study design. For the facility element the following search terms were used: ‘alternative education\*’, ‘alternative program\*’, ‘alternative setting\*’, ‘alternative school\*’, ‘alternative high school\*’, ‘alternative facilit\*’, ‘alternative learning center\*’. To define the population and outcome domains the following search terms were used: ‘high risk’, ‘at risk’, ‘vulnerable’, ‘disconnected’, ‘disengaged’, ‘behavior\*’, ‘delinquen\*’, ‘drop out’, ‘emotion\*’, ‘E/BD’, ‘behavioral’, ‘disciplin\*’, ‘criminal’, ‘academic’, ‘participat\*’, ‘graduat\*’, ‘dropout’, ‘retention’, ‘truan\*’, ‘substance\*’, ‘attendance’, ‘expulsion’, ‘psychosocial’, ‘disruptive’. The following search terms were used for the study design: ‘quantitative’, ‘program evaluation’, ‘summative evaluation’, ‘RCT’, ‘clinical trial’, ‘quasi-experiment\*’, ‘treatment outcome\*’, ‘program effect\*’, ‘treatment effect\*’, ‘evaluation’, ‘experiment\*’, ‘effective\*’. In addition, reference lists of the usable articles were inspected for additional relevant studies.

Multiple inclusion criteria determined the selection of studies. First, there had to be a quantitative outcome representing a domain of adolescent functioning. Second, the facility had to be focused on adolescents between the age of twelve and twenty-two. Third, to focus on nonresidential alternative educational facilities only, the facility had to be nonresidential, housed *outside* of a regular school, serving adolescents on a temporary basis with the focus on returning them to regular schools. This excluded alternative educational programs inside regular schools (e.g., extra support or unique classes) as well as special educational facilities (i.e., where adolescents receive long-lasting adjusted education and support), residential and juvenile justice facilities and studies on the effects of specific interventions within alternative educational facilities (e.g., the effects of cognitive behavioral therapy). Also, academic remediation-focused schools

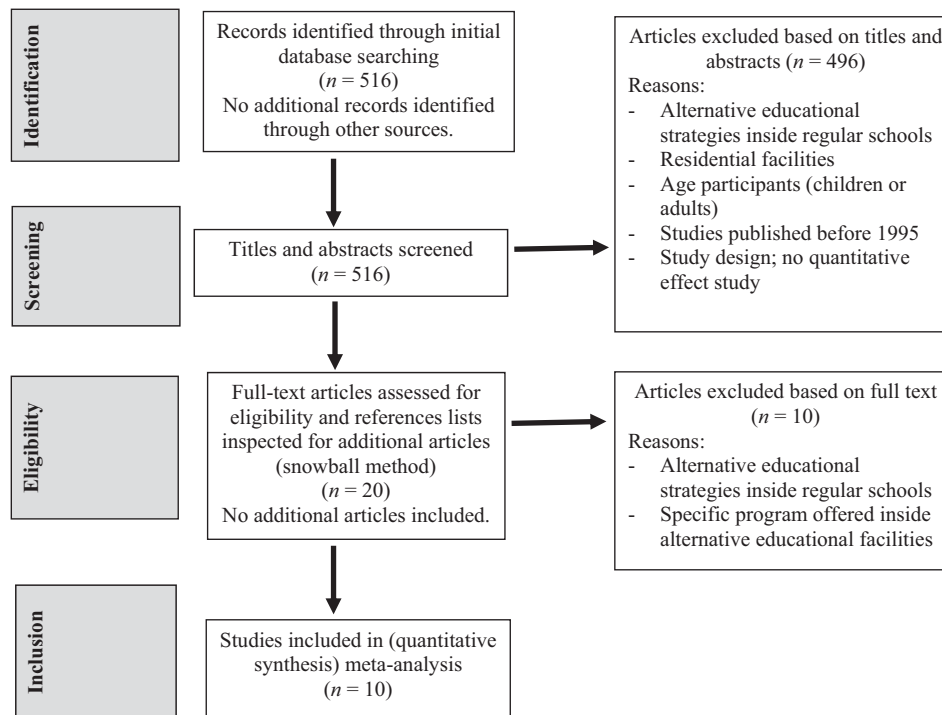


Figure 1. Flow diagram (Moher, Liberati, Tetzlaff, Altman, The PRISMA Group, 2009).

Table 1. Characteristics of included studies.

Author	Year	IF	Study design	$n$	$n - ES$	Informant	Continent
Aeby, Manning, Thyer & Carpenter-Aeby	1999	0.0	Quasi-Exp Cross	215	215	Mixed	USA
Carpenter-Aeby & Aeby	2001	3.9	Pretest- Posttest Long	100	100	Mixed	USA
Carpenter-Aeby & Aeby	2005	3.9	Pretest- posttest Long	599	548	Self-report	USA
Cox	1999	2.6	Pretest- posttest Long	83	83	Mixed	USA
Dugger & Dugger	1998	0.5	Pretest- posttest Long	130	115	Mixed	USA
Edgar-Smith & Palmer	2015	0.4	Rep. measure Long	148	75	Self-report	USA
Franklin, Streeter, Kim & Tripodi	2007	0.4	Pretest- posttest Long	85	85	Official Data	USA
Mirsky & Wachtel	2007	0.0	Pretest- posttest Long	919	328	Self-report	USA
Nichols & Utesch	1998	1.9	Pretest- posttest Long	199	39	Self-report	USA
Wilkerson et al.	2016	1.0	Posttest Cross	7551	280	Official Data	USA

Note. IF = impact factor of journal; Study design = quasi-experimental, pretest-posttest, rep. (repeated) measure, posttest, cross (cross-sectional), long (longitudinal);  $n$  = number of participants;  $n - ES$  = data available for ES calculations; informant, mixed = combination of self-report and official data.

were excluded when they primarily focused on academic remediation or credit recovery for students with physical or health impairments or learning disabilities, as they were not focused on the at-risk youth we intended to include.

The first, third and fourth authors conducted the screening and selection process. When in doubt, the other authors were consulted. Figure 1 shows a flow diagram of the search process. The initial search resulted in 516 articles, which contained quantitative studies as well as qualitative studies and reviews. By reading titles and abstracts 496 articles were excluded. Many studies did not match our definition of non-residential alternative educational facilities, were published

before 1995, or did not meet the criteria for study design. The remaining 20 articles were fully read. Based on reading the full text, ten studies were excluded due to their focus on alternative educational strategies *inside* regular schools or on a specific program offered *inside* an alternative educational facility. All references of the included studies were inspected to find additional studies (i.e., snowball method). No additional studies could be included through this method. The remaining ten studies, yielding 87 effect sizes, met the inclusion criteria. Table 1 provides an overview of the included studies and their characteristics. Included studies are marked with an asterisk in the reference list.

**Table 2.** Domains adolescent functioning including examples of assessed variables.

Domain	Examples
Social-emotional	Self-esteem, life skills, locus of control, self-efficacy, social values
Academic achievement	GPA, credits earned, test-score math, test-score English, graduation rate, reading achievement
Academic attitude	Attendance, absences, school attitude, task orientation, involvement, learning-, performance goals, intrinsic-, extrinsic motivation, persistence, self-regulation, drop-out
Externalizing problems	Delinquency, suspension, official discipline referrals
Internalizing problems	Depression

### Coding studies and potential moderators

The included studies were coded according to the guidelines of Lipsey and Wilson (2001) (e.g., effect size, sample size, construct measured). Four coders, with (nearly) a masters degree in the psychological field, were involved. After a short training from the first author, five studies were double coded in order to be able to calculate the inter-rater agreement. For the continuous variables an ICC of .95 indicated high inter-rater agreement. For the categorical variables a KAPPA of .62 showed additional agreements had to be made. Because of the low number of included studies, the other five studies were coded by two coders together to increase reliability. Disagreement in coding between the two coders led to the involvement of all four coders in order to reach consensus. In the case of missing relevant information or data, authors were contacted to try to obtain the missing information.

Each study was coded on multiple characteristics, which we chose to divide into four categories: assessment of outcomes, publication and study characteristics, participant characteristics and program elements. The overall outcome variable was adolescent functioning, which includes all kinds of outcomes (Table 2). To assess potential differences in types of outcomes, outcomes that were conceptually similar were combined in one domain (i.e., social-emotional functioning, academic achievement, academic attitude, externalizing problems or internalizing problems). These domains were determined by the coders and authors of this study based on the outcomes the studies reported on. Each domain had to contain outcome variables of at least two studies. Drop-out could not be included as a separate domain, because only one study reported a percentage of school drop-out. Therefore, drop-out was included in the domain academic attitude. The domain internalizing problems consisted of the variable depression only, as no other internalizing problems were used as outcome variables in the included studies. Table 2 lists the five domains with examples of the assessed variables.

Coded publication and study characteristics were publication year, impact factor of the journal in which the article was published, and study design (cross-sectional or longitudinal design, control group or not, and time of data collection). For longitudinal studies, study drop-out rates were taken into account, measured by comparing the number of participants at posttest to the number of participants at pretest. Also, the way effect sizes were measured (i.e., self-

report or official data) and the reliability of the assessment instruments were coded. Last, study quality was determined by means of the Quality Assessment Tool for Quantitative Studies (Armijo-Olivo, Stiles, Hagen, Biondo, & Cummings, 2012), rating several components of the study as strong, moderate or weak (i.e., selection bias, study design, confounders, blinding, data collection methods, and withdrawals or dropout). Coded participant characteristics were gender, ethnicity, age, and grade. The following program elements were coded: duration of the program in months and per day, class size, academic strategies, behavioral strategies, additional support or counseling, individual or group trainings, family involvement, community involvement, and transition support.

### Calculation of effect sizes and analyses

Outcome data were transformed into the effect size Cohen's *d*. A positive Cohen's *d* indicated a positive effect of the nonresidential alternative educational facility on the outcome domain, whereas a negative Cohen's *d* indicated a negative effect. The effects derive from comparisons between alternative educational facilities and 'treatment as usual' (regular education) or a waiting list program, or from a comparison between pretest and posttest or follow-up data. The effect sizes were calculated using formulas from Lipsey and Wilson (2001). An effect size was coded as zero if an article only mentioned that the relation was not significant (Lipsey & Wilson, 2001). There were no outliers identified in the effect sizes ( $> 3.29$  SD from the mean; Tabachnick & Fidell, 2007).

The continuous variables were centered around their mean, and the categorical variables were recoded into dummy variables. Standard errors and sampling variances of the effect sizes were estimated using formulas by Lipsey and Wilson (2001). The meta-analysis was conducted in R (version 3.5.0) with the metafor-package, using the syntaxes from Assink and Wibbelink (2016).

### Multilevel approach

All studies reported multiple effect sizes on different outcome domains. We applied a multilevel random effects model (Houben, Van den Noortgate, & Kuppens, 2015; Van den Bussche, Van den Noortgate, & Reynvoet, 2009; Viechtbauer, 2010), which has the advantage of accounting for the hierarchical structure of the data (i.e., nested effect sizes within studies). In this way, multiple effect sizes can be extracted from each included primary study, so that all study information can be preserved, and maximum statistical power is achieved (Assink & Wibbelink, 2016). A three-level random effects model was used to account for three levels of variance, including the sampling variance of each effect size (level 1), the variance between effect sizes extracted from the same study (level 2), and the variance between the studies (level 3) (Assink & Wibbelink, 2016).



### Checking for publication or selection bias

In meta-analyses the aim is to include all available studies previously conducted that meet the inclusion criteria (Lipsey & Wilson, 2001). In this meta-analysis, we only included published articles to guarantee a minimum reporting quality as in unpublished reports sufficient statistical information to calculate effect sizes was often lacking. Therefore, the included studies might not be an adequate representation of all previously conducted studies on nonresidential alternative educational facilities (i.e., publication bias; Rosenthal, 1995). In order to check for indications of publication bias we conducted a visual funnel plot analysis (Sutton, Duval, Tweedie, Abrams, & Jones, 2000). In addition we performed an Egger's test to examine the asymmetry of the funnel (Egger, Smith, Schneider, & Minder, 1997). Subsequently, we examined the effect of funnel plot asymmetry on the magnitude of the overall effect size by means of a trim and fill procedure (Duval & Tweedie, 2000). We did this by using the function 'trimfill' in the R metafor package (Viechtbauer, 2010). Last, a sensitivity analysis was conducted in order to examine if one or more studies had an exceptional influence on the overall effect size. This analysis was conducted by excluding all studies one by one, and run the overall effect on the remaining studies.

## Results

### Overall outcomes

The current multilevel meta-analysis on the outcomes of adolescents with complex problems attending nonresidential

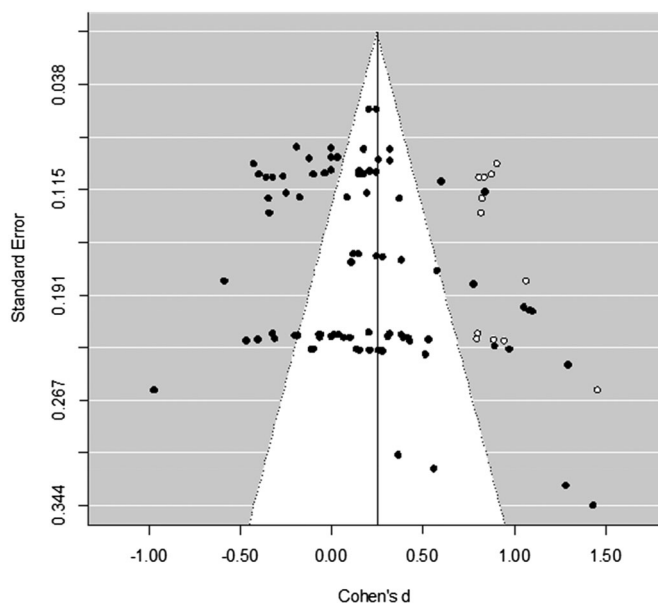


Figure 2. Funnel plot.

Table 3. Overall effect of nonresidential alternative educational facilities on adolescent functioning.

Outcome	<i>k</i>	#ES	Mean <i>d</i>	95% CI	<i>p</i>	$\sigma^2_{\text{level } 2}$	$\sigma^2_{\text{level } 3}$	% Var. Level 1	% Var. Level 2	% Var. Level 3
Outcome domains	10	87	0.15	0.02; 0.29	.03*	.10***	.03*	11.89	69.64	18.51

Note. Outcome domains = social emotional, academic achievement, academic attitude, externalizing problem behavior, internalizing problem behavior, *k* = number of studies; #ES = number of effect sizes; mean *d* = mean effect size; CI = confidence interval;  $\sigma^2_{\text{level } 2}$  = variance between effect sizes extracted from the same study;  $\sigma^2_{\text{level } 3}$  = variance between studies; % Var = percentage of variance distributed.

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

alternative educational facilities contains 10 independent studies (*k*), reporting on 87 effect sizes (#ES) and a total sample of  $N = 1,868$  participants (adolescents). Based on information of eight studies the mean age was 15.52 years ( $SD = 1.39$ ). All studies focused on alternative educational facilities for students with at-risk, disruptive or delinquent behavior, which interfered with their ability to profit from education in regular schools. The main goals for adolescents attending these facilities were to prevent school drop-out, improve academic performance, social skills and a positive attitude toward school, reduce delinquent activities, and transition back to regular school or obtaining a diploma. A small significant overall effect was found ( $d = .15$ ,  $p < .05$ ), which indicates that nonresidential alternative educational facilities were significantly associated with more positive adolescent functioning.

When checking for publication bias, the funnel plot shows twelve missing effect sizes at the right side of the funnel (Figure 2), while the Egger's test shows significant funnel plot asymmetry ( $t = 3.38$ ,  $p < .001$ ). Missing effect sizes at the right side of the funnel plot indicates selection bias instead of publication bias, which means that the overall effect may be an underestimation of the real effect. When conducting a trim and fill procedure it was shown that the overall effect increased from  $d = .15$  to  $d = .31$ .

Also, we conducted a sensitivity analysis to examine if one or more studies did have an exceptional influence on the overall effect size. The analysis showed that the effect size varied between  $d = .10$  and  $d = .18$ . Since this is closely to the overall effect of  $d = .15$ , and the confidence-intervals show overlap, there is no indication that one of the studies had an excessive influence on the overall effect.

The results of the likelihood-ratio test showed significant variance between effect sizes from the same study,  $\sigma^2_{\text{level } 2} = .10$ ,  $p < .001$ , and significant variance between studies,  $\sigma^2_{\text{level } 3} = .03$ ,  $p < .05$  (Table 3). Since the variances at level two and three were significant, it was concluded that there was heterogeneity among the effect sizes that may be explained by characteristics of studies, participants and program elements. Therefore, moderator analyses were conducted.

### Moderator analyses

Table 4 presents the results of the moderator analyses on the outcomes as examined for the five domains of adolescent functioning. No significant differences between the outcome domains were found. Four studies were classified as weak and six as moderate, using the Quality Assessment Tool for Quantitative Studies (Armijo-Olivo et al., 2012). Most weak scores were given on the categories blinding and data collection method. Only four studies used control

**Table 4.** Moderators of the effect of nonresidential alternative educational facilities.

	<i>k</i>	# <i>ES</i>	<i>B</i> <sub>0</sub> / <i>d</i>	<i>t</i> <sub>0</sub>	<i>B</i> <sub>1</sub>	<i>t</i> <sub>1</sub>	<i>F</i> ( <i>df</i> <sub>1</sub> , <i>df</i> <sub>2</sub> )
<b>Within study moderators</b>							
<b>Broad outcome domains</b>							
Social emotional (RC)	7	33	0.151	1.685 <sup>+</sup>			<i>F</i> (4, 82) = 0.080
Academic achievement	6	20	0.171	1.611	0.020	0.176	
Academic attitude	8	27	0.154	1.636	0.003	0.031	
Externalizing problems	2	4	0.064	0.308	-0.086	-0.393	
Internalizing problems	2	3	0.217	1.006	0.066	0.302	
<b>Type of Reporting</b>							
Official data	6	27	0.047	0.549			<i>F</i> (1, 85) = 10.955**
Self report	8	60	0.369	3.572***	0.322	3.310**	
<b>Time</b>							
Posttest only (RC)	3	9	0.266	1.634			<i>F</i> (2, 84) = 1.434
Pretest - Posttest	9	68	0.160	2.153*	-0.106	-0.639	
Pretest - Follow-up	2	10	-0.053	-0.365	-0.319	-1.512	
<b>Between study moderators</b>							
<b>Publication characteristics</b>							
Year of publication	10	87	0.180	2.743**	-0.017	-1.589	<i>F</i> (1, 85) = 2.525
Impact factor	10	87	0.152	2.171*	-0.014	-0.293	<i>F</i> (1, 85) = 0.086
<b>Study characteristics</b>							
<b>Design</b>							
Cross-sectional (RC)	3	9	0.258	1.578			<i>F</i> (1, 85) = 0.514
Longitudinal	9	78	0.139	1.889 <sup>+</sup>	-0.119	-0.717	
<b>Control group</b>							
Yes (RC)	4	43	0.151	1.369			<i>F</i> (1, 85) = 0.000
No	6	44	0.153	1.649	0.002	0.014	
<b>Type of control group</b>							
Traditional school (RC)	3	23	0.156	1.687 <sup>+</sup>			<i>F</i> (1, 41) = 0.038
Waiting list	1	20	0.183	1.768	0.027	0.194	
<b>Controlled for pretest</b>							
Yes (RC)	3	34	0.097	0.823			<i>F</i> (1, 85) = 0.355
No	9	53	0.176	2.139	0.079	0.596	
<b>Study quality</b>							
Moderate (RC)	6	48	0.056	0.777			<i>F</i> (1, 85) = 4.573*
Weak	4	39	0.305	3.359**	0.249*	2.138*	
Reliability	4	22	0.238	1.569	-1.579	-2.462*	<i>F</i> (1, 20) = 6.061*
<i>N</i> total	10	87	0.161	2.384*	-0.001	-0.667	<i>F</i> (1, 85) = 0.445
<i>N</i> experimental	10	87	0.154	2.180	-0.000	-0.100	<i>F</i> (1, 85) = 0.010
<i>N</i> control	4	43	0.176	2.600*	-0.003	-1.528	<i>F</i> (1, 41) = 2.334
Percentage study drop-out	4	38	0.115	0.606	-0.581	-1.327	<i>F</i> (1, 36) = 1.760
<b>Participant characteristics</b>							
Percentage male	9	67	0.145	1.833 <sup>+</sup>	-0.523	-0.888	<i>F</i> (1, 65) = 0.788
Mean age	8	73	0.110	1.920 <sup>+</sup>	0.003	0.071	<i>F</i> (1, 71) = 0.005
Mean grade	6	47	0.210	1.922 <sup>+</sup>	-0.038	-0.557	<i>F</i> (1, 45) = 0.310
Percentage majority	8	55	0.135	1.493	0.235	0.611	<i>F</i> (1, 53) = 0.373
<b>Program elements</b>							
Duration program	8	76	0.149	2.127*	-0.030	-1.832 <sup>+</sup>	<i>F</i> (1, 74) = 3.457 <sup>+</sup>
<b>Family involvement</b>							
Yes (RC)	4	48	0.100	1.000			<i>F</i> (1, 85) = 0.554
No	6	39	0.200	2.161*	0.101	0.744	
<b>Community involvement</b>							
Yes (RC)	4	44	0.250	2.641			<i>F</i> (1, 85) = 1.933
No	6	43	0.072	0.836	-0.178	-1.390	
<b>Transition support</b>							
Yes (RC)	4	48	0.100	1.000			<i>F</i> (1, 85) = 0.554
No	6	39	0.200	2.161*	0.101	0.744	

Note. *k* = number of independent studies; #*ES* = number of effect sizes; *B*<sub>0</sub>/*d* = intercept/ mean effect size; *t*<sub>0</sub> = difference in mean *d* with zero; *B*<sub>1</sub> = estimated regression coefficient; *t*<sub>1</sub> = difference in mean *d* with reference category; *F*(*df*<sub>1</sub>, *df*<sub>2</sub>) = omnibus test; (RC) = reference category.  
<sup>+</sup>*p* < .10, \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

groups. Study quality proved to be a significant moderator, with qualitatively weaker studies showing larger effect sizes compared to moderate quality studies. In line with this, the reliability of the assessment instruments, which is an aspect of study quality, was a significant moderator. Less reliable instruments showed larger effect sizes when compared to more reliable instruments. The inclusion of control groups and the time of data collection (posttest or follow-up) were no significant moderators. Type of reporting was a significant moderator. Self-report was associated with larger effect sizes than official data. No participant characteristics moderated the overall effect

size. Due to insufficient data on program elements, only few could be tested as a moderator (i.e., duration of the program in months, family involvement, community involvement and transition support). Of the tested program elements, a trend was found for the duration of the placement in the alternative educational facility (with means varying from two months to one and a half year). The longer the duration of the placement, the smaller the effects. The other program elements could not be tested because not all studies clearly reported on them (e.g., class size, length of day program and what academic, behavioral or support strategies were implemented).

## Discussion

The current multilevel meta-analytic study examined the outcomes of adolescents with complex problems who are at risk for school drop-out attending nonresidential alternative educational facilities. The outcomes were measured on five domains of adolescent functioning: social-emotional functioning, academic achievement, academic attitude, externalizing problems and internalizing problems. Ten studies (1995–2017) with a total of 87 effect sizes, showed a small significant effect ( $d = 0.15$ ,  $p = .03$ ). No significant differences between the outcome domains were found. Some study characteristics (i.e., study quality, type of reporting, and reliability of the assessment instruments) moderated the overall effect. Participant characteristics and program elements did not moderate the overall effect; a trend was found for the duration of the placement in the alternative educational facility.

Although only a small significant effect was found, the results provide preliminary evidence that nonresidential alternative educational facilities may be associated with positive outcomes for adolescents. Previous research has shown difficulties in achieving positive effects with interventions aimed at youth with complex problems. For example, in a recent meta-analysis on the effectiveness of youth psychotherapy, no significant treatment effect on youth with complex problems was found (Weisz et al., 2017). The small significant effect of the current study implicates that it is worthwhile to invest in the further development and high quality research of nonresidential alternative educational facilities, because they can contribute to positive youth outcomes, which in turn may prevent school drop-out and a path toward (residential) out-of-home placement and other negative life outcomes (e.g., unemployment, involvement in the criminal justice system).

The fact that no differences were found between the five outcome domains indicates that nonresidential alternative educational facilities might have a generic effect on adolescent functioning. It is possible that improvements in one domain affect improvements in other domains because of the known high comorbidity of problems in adolescents with complex problems (Edgar-Smith & Palmer, 2015), and because these facilities are known to focus on multiple domains of adolescent functioning (Porowski, O'Connor, & Luo, 2014). Participant characteristics (i.e., gender, age, grade and ethnicity) were no significant moderators. Because of the low amount of studies included in our meta-analysis, and the lack of information on participant characteristics, only few characteristics could be tested. Further research on the effects for different groups of participants is needed to draw firm conclusions about the role of participant characteristics.

We found a trend indicating that longer during placements were associated with smaller effect sizes, which shows that it might not be effective to place adolescents in an alternative educational facility for a long period of time. This corresponds with research on residential care (Hair, 2005), and might be explained by adolescents' loss of motivation to

work on their future perspective if this is too far ahead (Van der Helm, 2011). This finding requires further research.

Previous research showed family and community participation and transition support to be integral elements of effective alternative educational programs (e.g., Aron & Zweig, 2003; Murray, 2013; Sheldon & Epstein, 2002). Against expectations, these program elements did not moderate the overall effect size. This may indicate that the effect of nonresidential alternative educational facilities depends on particular combinations of program elements instead of a single program element. This possible explanation could not be tested in our meta-analysis due to lack of studies. This finding requires further research, as poor reporting practices on program elements of alternative educational facilities hampers testing program elements (see limitation of this study, below).

A few limitations make careful consideration of the results of this meta-analysis necessary. First, only ten studies were found that met our inclusion criteria. Many studies had to be excluded because they did not fit our definition of alternative education, did not have the right study design (e.g., qualitative descriptions), had methodological shortcomings or showed inadequate reporting. Also, all ten studies were conducted in the United States, potentially limiting generalizability to other countries or continents.

Second, we only included published articles, as reporting of the results in unpublished reports mostly was of low quality. Although this might increase the risk for publication bias (Cheung & Slavin, 2016), in particular inflation of the overall effect size, our publication bias analysis showed the contrary, indicating an underestimation of the true overall effect size, as we found twelve effect sizes were missing on the right side of the funnel plot (Figure 2), which means that studies that report relative small effect sizes were overrepresented.

Third, the study quality of the included studies was low. For example, six studies did not include a control group, which makes it difficult to rule out alternative explanations for the found effects. Also, in two of the four studies with a control group participants of the alternative educational facility were matched with adolescents in regular education. Although matched on several variables, it is possible that the control group differs from the experimental group, as the controls had not been referred to an alternative educational facility. No studies compared different types of alternative educational settings (e.g., residential and nonresidential). In line with previous research, study quality turned out to be a significant moderator, with lower quality studies showing larger effects (Cheung & Slavin, 2016). Also, studies that used less reliable instruments and self-report were related to larger effect sizes. This might have led to an inflation of effects and is indicative of the current status of the research in this field. Higher quality research is required, using valid and reliable instruments, multiple informants and various data-sources. Studies eliminating data on study drop-outs (up to 52%) from statistical analysis may have resulted in inflated effects (also reported by Cox et al., 1995), as only the functioning of adolescents who completed the program



was measured. In these cases, intention to treat analysis is required.

Fourth, this meta-analysis was hindered by poor reporting practices on participant and program elements. If descriptions were given, they mostly consisted of *intended* participants and program elements and not the degree to which this was met in practice (i.e., program integrity). Other research has shown that the actual implementation of effective program elements in alternative educational facilities is limited (Flower et al., 2011). This is problematic because literature shows that implementing with high fidelity is important to achieve the desired effects (Goense, Assink, Stams, Boendermaker, & Hoeve, 2016; Wilson & Lipsey, 2007). There is not only a need to expand our understanding of effective program elements, but also to focus on better implementation of what is already known to be effective (Landrum et al., 2003). Also, the insufficient reporting practices limited possibilities for moderator analyses, as we could only test moderators for which we had sufficient information, a limitation that was already described more than 20 years ago (Cox et al., 1995).

Last, only one study reported school drop-out rates as outcome variable, although one of the overall goals of alternative educational facilities is preventing school drop-out. Also, no data was reported on the living situations of adolescents attending alternative educational facilities. Therefore, it was not possible to determine the influence of these facilities on rates of out-of-home placement. In future research, school drop-out and out-of-home placement should be taken into account as outcome measures. Also, more outcome variables with regard to internalizing problems should be included.

This meta-analysis is difficult to compare with other research in this field, as in most studies residential (e.g., juvenile justice facilities) and nonresidential facilities are included in the same definition of alternative educational facilities, or it is not clearly described if residential facilities are included (e.g., Cox et al., 1995; Flower et al., 2011). In the current study, we focused on nonresidential facilities only. One of the key findings of this meta-analysis is that we still know little about the outcomes and effective program elements to serve adolescents with complex problems in nonresidential alternative educational facilities. This is a risk, because of the negative downward spiral these adolescents face, and the immense human and financial costs. Also, qualitative studies have described the risks for alternative educational facilities to become “pit stops” along the school-to-prison pipeline, instead of the intended innovative and unique ways to educate students who do not respond to traditional forms of education (Horsford & Powell, 2016).

It is crucial that researchers and practitioners collaborate to learn more about effective program elements (Gable, Bullock, & Evans, 2006), to help adolescents with complex problems, who are at increased risk for school drop-out, getting their life back on track. Alternative educational facilities will only be effective if the services offered fit the needs of the adolescents involved, and are implemented with high treatment fidelity. The risk-needs-responsivity (RNR) model,

originally designed for offender rehabilitation (Andrews, 1995; Andrews, Bonta, & Hoge, 1990; Andrews & Bonta, 2010), might provide a theoretical base to further investigate the working mechanisms through which diverse alternative educational facilities can have a positive impact on adolescent functioning. The RNR model assumes effective rehabilitation to follow three principles: the risk principle, or whom to treat (i.e., match the intensity of service to the risk for school drop-out), the need principle, or what to treat (i.e., assess and target dynamic risk and protective factors that are related with school drop-out), and the responsivity principle, or how to treat (i.e., treatment should make use of youth’s social cognitive learning strategies and be tailored to the motivation, personality and learning style of the adolescent) (Andrews & Bonta, 2010). Adherence to these principles might be effective in alternative educational facilities. This requires us to learn more about the whom, what and how to treat. High quality research, clear definitions of alternative education, good statistical reporting practices, detailed descriptions of participants, program elements and program integrity are all necessary.

Because of the serious human and financial consequences of school drop-out and the iatrogenic effects of residential out-of-home placement, there is an urge for effective non-residential programs. This meta-analysis specifically focused on nonresidential alternative educational facilities, and showed that it is worthwhile to invest in the further development and high quality research on effective nonresidential alternative educational facilities for youth with complex problems, because they can contribute to positive youth outcomes, which in turn may prevent school drop-out and a path toward (residential) out-of-home placement and other negative life outcomes.

## Declaration of interest statement

The first author is an employee of an organization delivering youth care and special education; this organization is not affected by the research reported in this paper.

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## Notes on contributors

*Sanne Pronk* is PhD student at the University of Amsterdam and working as a researcher at Altra Education and Youth Care (united in the alliance iHUB) in the Netherlands.

*Chris Kuiper* PhD is quality controller at Horizon Youth Care and Special Education (united in the alliance iHUB where he is innovation manager). He also works as a professor (lector) at the University of Applied Sciences Leiden.

*Dafne Smit* MSc is a school psychologist at Altra Education and Youth Care.

**Prof. Dr. Geert Jan Stams** is professor at the University of Amsterdam, Department of Child Development and Education.

**Prof. Dr. Arne Popma** is professor at Amsterdam UMC, VU Medical Center, Department of Child and Adolescent Psychiatry.

**Eva Mulder** PhD is program leader of the Academic Workplace Youth at Risk, linked to the Amsterdam UMC, VU Medical Center, Department of Child and Adolescent Psychiatry.

**Germie van den Berg** PhD is head of the department of integrated youth care at the Netherlands Youth Institute in Utrecht.

## ORCID

Sanne Pronk  <http://orcid.org/0000-0003-0471-568X>

Eva Mulder  <http://orcid.org/0000-0002-5906-5867>

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