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The impact of classroom climate on students attending secondary special education

Beld, M.H.M.

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The impact of classroom climate on students attending secondary special education

Marjorie Beld
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This study is partly financed by the Dutch Research Council (NWO) with a grant for teachers (project number 023.003.158).

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Kunstenaars Ursula Aubri over haar schilderij dat afgebeeld is op het omslag: “De heldere kleuren staan voor het pure en ongeschondene en vertegenwoordigen in deze vorm een eigen identiteit, zoals elke leerling dat heeft. Dit tegen een donkere, onregelmatige achtergrond, wat de soms onzekere levensloop van een leerling representeert. De compositie is open en uit het midden gehaald. Elk persoon die de leerling tegenkomt brengt hem of haar iets en ergens anders, dat wat bij de leerling past neemt hij of zij hier van mee en kan bewegen bewerkstelligen. De kunst is om het schilderij met open vizier te bekijken, evenals je dat een leerling voor zijn of haar kijk op toekomst toewenst.” Ursula Aubri, geboren 6 augustus 1976 te Enschede

Artist Ursula Aubri about her painting that is displayed on the cover: “The bright colors represent the pure and the unharmed and in this form represent an own identity, just like every student has. This against a dark, irregular background, which represents the sometimes uncertain life of a student. The composition is open and drawn from the middle. Every person the student encounters in life brings him somewhere and something. The student picks up what suits him the best and movement can be effectuated. View the painting with an open visor, just like you wish a student to view his future.” Ursula Aubri, born 6 August 1976 in Enschede
Still Learning
The impact of classroom climate on students attending secondary special education

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnificus
prof. dr. ir. K.I.J. Maex

ten overstaan van een door het College voor Promoties ingestelde commissie,
in het openbaar te verdedigen in de Singelkerk te Amsterdam
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door

Marjorie Hanneke Maria Beld
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General introduction
Almost four million children and adolescents under the age of twenty are living in The Netherlands (CBS, 2019). About five to ten percent of them have severe emotional and behavioral problems or developmental disorders (NCOJ, 2016; Stevens et al., 2018). More than 22,000 of these youths are enrolled in – so called – Cluster IV schools for special education, which serve children and adolescents with emotional and behavioral problems who cannot attend regular education, and for whom professional care is indicated (NCOJ, 2016; Rijksoverheid, 2019). Cluster IV education is offered in schools for primary and secondary special education, including (semi-)residential youth care institutions. In the Netherlands, around 17,000 young people aged 12-18 live in (semi-)residential institutions (Leloux-Opmeer, Kuiper, Swaab, & Scholte, 2016; Ter Beek, van der Rijken, Kuiper, Hendriks, & Stams, 2016).

Special education in (semi-)residential youth care can make an important contribution to the development of children and adolescents, because it offers a daily structure, perspective, and prepares them for a job and a future outside the institution (Gordon & Weldon, 2003; Jancic, 1998; Smeets, 2011). However, it is not easy to offer this youth education that matches their possibilities and learning motivation (Gover, Mackenzie, & Armstrong, 2000; Leone & Weinberg, 2010). This is due to the fact that thirty percent of youths staying in residential institutions have lost their commitment to school (Van der Helm & Austmann, 2012; Vermaes, Konijn, Nijhof, Strijbosch, & Van Domburgh, 2012), show learning disabilities, and have severe writing and reading problems (Herweijer, 2008; Van der Helm & Austmann, 2012). In addition, Smeets (2011) demonstrated that forty to sixty percent of these youths have an intellectual disability or attention deficit disorder. Moreover, they often have low self-esteem and low self-confidence, which may be caused by previous negative educational experiences (Ireson & Hallam, 2009; Van der Helm & Austmann, 2012).

Particularly relevant for the specific tasks of (residential) schools for special education is Withall’s (1949) seminal study on classroom climate, which showed that meaningful learning can only take place in a safe environment. Results of this study were replicated by Anderson in 1970. Learning performance of students can deteriorate if the classroom climate is perceived as unsafe (Barth et al., 2004), whereas a safe climate can promote their learning performance. Studies by Scholte and Stoutjesdijk (2011) and Maslowski, Doolaard and Bosker (2008) found that learning performance was positively affected by classes showing positive relationships among students and teachers. In addition, Gietz and McIntosh (2014) found a link between students’ perceptions of classroom climate and their improvements in math skills and literacy.

Fewer conflicts occur and less sanctions are imposed for misconduct in schools with a safe classroom climate (Bosker & Hofman, 1994; Steffgen, Recchia, & Viechtbauer, 2013; Veen, Vergeer, Van Oenen, Glaudé, & Breetvelt, 2007). In addition, Barth and colleagues
(2004) demonstrated that an unsafe classroom climate leads to more student aggression and poorer peer relationships. Furthermore, the chance of criminal behavior increases if young people do not experience pleasure or equality at school (Feinstein, 2002; Sabates, Feinstein, & Singhal, 2008). The school can also create a situation in which association with deviant peers can evoke criminal behavior (Gottfredson & Soulé, 2005). Finally, Van Ampt and colleagues (2000) showed that a safe classroom climate contributes to the socio-emotional development and self-confidence of young people, so that they develop a positive attitude towards school and learning, which encourages them to enter into and maintain positive relationships with fellow students and teachers.

Although the importance of high-quality education and a safe classroom climate is supported by empirical research, the quality of special education for students with emotional and behavioral problems has not always been satisfactory in the Netherlands. For instance, research by the Inspectorate for Education (2012) showed that more than a third of Cluster IV schools performed poorly to very poorly in recent decades. Education is not sufficiently attuned to individual differences between students, and the process to monitor and improve the quality of education is difficult to achieve, especially within the (semi-)residential youth institutions. In order to improve the quality of education, from August 2014 schools were required to offer appropriate education (‘passend onderwijs’) to children and adolescents who need extra support (Article 18A, paragraph 2 of the Appropriate Education Act). This measure has been taken because appropriate education can reduce the risk for behavioral problems, social-emotional problems or criminal behavior of young people (Feinstein, 2002; Johnston, 2004; Lotz & Lee, 1999; Murray, 2009).

In order to be able to offer appropriate education, it is important to know how the classroom climate can meet the needs of young people with emotional and behavioral problems in special education. Within regular education, quality of relationships among students as well as between teachers and students, and order in the classroom have been shown to be important dimensions of classroom climate (Donkers & Vermulst, 2014; Scholte & Stoutjesdijk, 2011). However, the behavior and learning capacity of students in regular education is different from that of students with emotional and behavioral problems in special education (Crosnoe 2002; Konijn & Verhulst, 2006; Skarbrevik, 2010; Van de Werfhorst, Berghof, & Veenstra, 2012). For this reason, it is possible that dimensions and correlates of classroom climate differ between schools for regular and special education.

To date, most studies have focused on classroom climate in regular education. I therefore conducted a systematic search for studies examining classroom climate within special education (see the Appendix). The search yielded only one study, namely, the study by Decker, Dona and Christenson (2007). This study examined only one
dimension of classroom climate in special education, namely, the quality of teacher-student relationships and its positive influence on the social skills and behavior of youth with problematic behavior who were eligible for special education. It can therefore be concluded that not only little is known about classroom climate in special education, but also that there is no (well-validated) measuring instrument available to assess the different dimensions of classroom climate in special education.

The current dissertation will therefore focus specifically on classroom climate in secondary special education (Cluster IV) by first developing and validating a classroom climate instrument for use in special education within and outside residential institutions. Subsequently, the relation between classroom climate in special education and two aspects that are assumed to be directly associated with the future perspective of students attending special education will be examined. In residential schools for special education, this is the academic self-concept of the student, in addition to self-esteem and identification with school, which have been shown to be important antecedents of students’ school performance and school functioning in general (Byrne, 1996; Maras, Gridley, & Moon, 2018). In schools for special education outside residential institutions, this is perceived social exclusion, which sets limits to the successful participation in society of students with emotional and behavioral problems (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Margalit, 2010; Spinrad et al., 2004).

Not only does this dissertation provide insight into the characteristics of classroom climate in special education, and more particularly its valid and reliable measurement, but also into the association between classroom climate in special education and the student’s academic self-concept and social relationships with peers. The results should provide tools to improve the quality of special education for students with emotional and behavioral problems. These tools should give students the opportunity to take maximum advantage of the education they are offered, which in the end should increase the chance of obtaining a diploma, work, and thereby successful participation in society.

**OUTLINE OF THE DISSERTATION**

In the first study (Chapter 2), the internal structure, convergent validity, and reliability of the student self-report Special Education Classroom Climate Inventory (SECCI) is examined in a sample of 325 students attending special education classes in six (semi-) secure residential settings and in two youth prisons in the Netherlands. The SECCI is a self-report instrument that purports to assess (problematic) classroom climate in schools for special education for students in (secure) residential youth care. Chapter 3 examines
whether a positive classroom climate, identification with school, and general self-worth can improve academic self-concept of students attending internal schools for special education in residential youth care institutions. The sample consists of 184 youth (63.6% male students, age $M = 16.40$, $SD = 1.99$) with severe emotional and behavioral problems. Chapter 4 focuses on the development, factor structure, and reliability of the revised Special Education Classroom Climate Inventory (SECCI-R) in a construction sample of $N = 401$ students ($M$ age = 15.27, $SD = 2.52$, 71.4% male students), and a validation sample of 1,596 youth ($M$ age = 14.55, $SD = 2.42$, 78.2% male students), representing 255 classes from 26 schools for special education in The Netherlands. In chapter 5, the relation between classroom climate in schools for secondary special education and students perceived social exclusion is examined. A total of 401 Dutch adolescents ($M$ age = 15.27, $SD = 2.52$, 70.3% male students) with conduct problems attending schools for special education filled out questionnaires on classroom climate, social information processing, externalizing behavior and perceived social exclusion. Finally, Chapter 6 provides an overall conclusion of the dissertation. The results of the four empirical studies are discussed in light of current knowledge on effectiveness of education in general. Additionally, the strengths and limitations of the dissertation are summarized. The chapter concludes with suggestions for future research and implications for special education.
REFERENCES


Chapter 1


Chapter 1


Assessing Classroom Climate in Special Education: A Validation Study of the Special Education Classroom Climate Inventory

ABSTRACT

This study examined the internal structure, convergent validity, and reliability of the student self-report Special Education Classroom Climate Inventory (SECCI) in a sample of 325 students attending special education classes in six (semi) secure residential settings and in two youth prisons in the Netherlands. Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) provided evidence of a theoretically based four-factor model— with Teacher Support, Positive Student Affiliation, Negative Student Interactions, and Unstructured Classroom Environment as dimensions—showing an adequate fit to the data, providing preliminary support for validity of the SECCI. Limited evidence for convergent validity was found in significant but small associations between classroom climate and academic self-concept. Ordinal Cronbach’s alpha reliability coefficients were good for all factors. The SECCI might be used to assess and subsequently target (problematic) classroom climate in schools for special education for students in (secure) residential youth care and youth prisons, although further development of the SECCI and replication of our study results seem necessary.
INTRODUCTION

If children between the ages of 12 and 18 years cannot live at home or in foster care, mostly due to severe psychiatric and behavioral problems or criminal behavior, they are treated in (secure) residential youth care facilities or youth prisons where they attend special education classes (Carman, Dorta, Kon, Martin, & Zarrilli, 2004). It is assumed that a positive classroom climate can increase learning motivation of juveniles attending (special) education in residential youth care (Anderson, Hamilton, & Hattie, 2004) and improve their academic effort and competence (Maras, Demetre, Moon, & Tolmie, 2012).

Although various measures have been developed for the assessment of classroom climate (Altaf, 2015) and school climate (Ramelow, Currie, & Felder-Puig, 2015; Voight & Hanson, 2012) in regular education, a self-report questionnaire for measuring classroom climate for students in residential schools for special education has yet to be developed, in particular because mental disorders, trauma, and conduct problems in adolescents living in residential institutions (Colins et al., 2010; Van Dam, Nijhof, Scholte, & Veerman, 2010) may lead to different classroom dynamics compared with regular education. The present study therefore describes the development of the Special Education Classroom Climate Inventory (SECCI), which is a student self-report questionnaire designed to assess the climate in the classrooms of residential schools for special education and examines the internal structure and convergent validity of the SECCI.

Classroom Climate and Its Assessment

Most research in (regular) education has focused on school climate instead of classroom climate (Clifford, Menon, Gangi, Condon, & Hornung, 2012; Steffgen, Recchia, & Viechtbauer, 2013; Thapa, Cohen, Guffey, & Higgins-D’Alessandro, 2013). Clifford et al. (2012) defined school climate as “the quality and the characteristics of school life” (p. 3). In their review, Thapa et al. (2013) defined the essential dimensions of school climate, including safety; teacher–student relationships and relationships among students, teaching, and learning; institutional environment (e.g., physical surrounding and resources); and the school improvement process (the results of school reform programs). These dimensions of school climate may be subsumed under the two main dimensions: Support and Structure (see Stockard & Mayberry, 1992).

Where school climate refers to the quality and character of school life, classroom climate refers to the quality of the students’ proximal social learning environment (McRobbie & Fraser, 1993), in particular with respect to teacher support and structure as well as group atmosphere among students, from the perspective of conditions that facilitate the learning motivation, academic achievement, and cognitive and social development of students (Altaf, 2015; Moos, 1979). In schools for special education,
especially in secure residential institutions, it might not be the communication among teachers and students in the school that matters most but more specifically the communication among students (and their teacher) in the classroom (Anderson et al., 2004; Breeman et al., 2014; Weber, Somers, Day, & Baroni, 2016). Moreover, students in special education settings regularly participate in only one class, enter only one classroom, and encounter only one or very few teachers. Hence, the classroom climate is probably more salient compared with the school climate.

Often students in special education have problems not only with cognitive (i.e., executive) functioning but also with social-emotional functioning, affective functioning (i.e., trusting others), and developing an identity (Carman et al., 2004; Quinn, Rutherford, Leone, Osher, & Poirier, 2005). In special education classes, in particular those within residential settings, teachers provide rather individualized instruction, paying increased attention to socioemotional and identity-development of their students (Carman et al., 2004).

Already in 1949, Withall (1949) searched for a way to measure classroom climate and suggested that meaningful learning of students can only occur in safe, nonthreatening situations, and that knowledge about the psychological atmosphere in the classroom is very important. Research in regular schools shows that the classroom climate is one of the most important factors influencing social-emotional behavior and learning motivation of students (Anderson et al., 2004; Wissink et al., 2014). The dimensions assessed in most research on classroom climate (for an overview, see Altaf, 2015) pertain to three broad domains of classroom experiences: (a) Interpersonal Relationships (involvement, affiliation, and support), (b) Goal Orientation (task orientation and competition), and (c) System Maintenance and Change (order and organization, rule clarity, teacher control, and innovation).

Only limited research has been conducted on classroom climate in special education classes and not, or hardly any, on education in (secure) residential settings and youth prisons for adolescents and young adults with severe behavioral problems. As far as we know, there is only one validated student self-report instrument for classroom climate in special education, namely, the revisited version of the Classroom Environment Scale (CES-SP; Trickett, Leone, Fink, & Braaten, 1993). However, the CES-SP proved to be marginally reliable, with only one scale showing satisfactory reliability (teacher support, Cronbach’s α = .70), but three scales yielding insufficient alphas below .60 (affiliation, task orientation, and teacher control).

Given the rather low reliabilities of the CES-SP and the particular context of special education classrooms in (secure) residential institutions and youth prisons, dealing with justice-involved adolescents showing high levels of psychopathology and often a mild intellectual disability, we decided to develop a brief and simple student self-report
instrument assessing classroom climate based on the available literature: the SECCI.

Given the major importance of the interpersonal relationship dimension between teachers and students for educational and behavioral outcomes (Altaf, 2015; Carman et al., 2004; Jellesma, Zee, & Koomen, 2015; MacAulay, 1990; Moos, 1979; Roorda, Koomen, Spilt, & Oort, 2011), we developed two scales that aim to measure student interactions (Positive Student Affiliation and Negative Student Interactions), and one scale that aims to measure support by the teacher. Because lack of order and classroom disorganization are antagonistic to successful goal orientation and system maintenance (Altaf, 2015; MacAulay, 1990), and because students in special education classes find it difficult to concentrate in the classroom, follow the rules, and comply with teacher directives in an unstructured environment (Hocutt, 1996), the SECCI contains a scale that measures unstructured classroom environment.

The goal of the present study is to validate the SECCI for students receiving special education in (secure) residential settings and youth prisons. We used both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to examine the internal structure of the SECCI (Goodwin & Leech, 2003; Rios & Wells, 2014). To test convergent validity (Goodwin & Leech, 2003), we examined the associations between classroom climate and student’s academic self-concept in terms of perceived academic effort and academic competence (Maras et al., 2012). This is because in particular academic self-concept arises from social-environmental rather than personal factors and affects both academic achievement and classroom behavior (Guay, Marsh, & Boivin, 2003; Maras et al., 2012). Reliability is tested by computing ordinal Cronbach’s alphas for each subscale of the SECCI (Gadermann, Guhn, & Zumbo, 2012).

**METHOD**

**Participants**

A total of 325 pupils (63% boys, 37% girls; 13% placed under criminal law in youth prisons and 87% under civil law in secure settings) participated in the study; the mean age of respondents was 16.1 years ($SD = 2.0$, age range = 12-25 years). The study was performed in 2013 in the Netherlands in eight schools for special education in six secure residential settings and two youth prisons. Originally, the sample consisted of 465 students who were asked to fill in the SECCI questionnaire. The nonresponse rate was 30.1%, leaving a sample of 325 students. The main reasons for nonparticipation were acute psychotic problems, going to court that day, or lack of motivation.
Chapter 2

Procedure
Schools were selected to represent a wide range of schools in Dutch secure special education to enhance generalizability of results. Some schools were located in the same building as the living groups and other schools were located in separate buildings. All students were asked to participate voluntarily and signed an informed consent declaration, which guaranteed anonymity. The questionnaires were given a number to guarantee anonymity of the participants. Respondents had 1 day available to fill in the questionnaire and handed in the questionnaire in a sealed blank envelope.

Questionnaires
SECCI The questionnaire (Dutch language) was designed to be used with students showing low cognitive levels or a mild intellectual disability. In a test-trial in a Dutch youth prison in 2011, 26 pupils filled in the 40-item questionnaire and commented on the questionnaire. From this research, we then drew up a final list of 22 items with four scales rated on 3-point response format, ranging from 1 = I do not agree to 2 = I neither agree or disagree and 3 = I agree (see Table 1). Each item belongs to only one of the four scales for classroom climate. The Teacher Support Scale (seven items) assesses the responsiveness of teachers to specific needs of the students. Paying attention to students, taking complaints seriously, respect, and trust are important characteristics of teacher support. An example of a support item is “The teachers are listening to us.” The Negative Student Interactions Scale (six items) assesses negative student interactions in the classroom. An example of a negative student interactions item is “We call each other names in the classroom.” The Positive Student Affiliation Scale (five items) assesses positive student affiliations in the classroom. An example of a positive student affiliation item is “I like to work together with my classmates.” The Unstructured Classroom Environment Scale (four items) assesses the degree to which the classroom environment lacks structure. An example of an unstructured classroom environment item is “The classroom is never quiet.” Higher scale scores on the SECCI scales represent more teacher support, more negative student interactions, more positive student affiliations, and a more unstructured classroom environment.

About Me Questionnaire: Academic Competence and Academic Effort. A simplified and shortened Dutch translation of the About Me Questionnaire was used (Beld, Van der Voort, Van der Helm, Kuiper, & Stams, 2017; Maras et al., 2012), assessing Academic Competence (i.e., how capable the student thinks he is in the area of academic skills) and Academic Effort (i.e., whether the student thinks he puts effort in school and whether he is willing to learn), using a 4-point response format: 1 = completely disagree, 2 = disagree more than agree, 3 = agree more than disagree, 4 = completely agree. An example
### Table 1 | Exploratory Factor Analysis of the SECCI: Standardized Loadings, communalities (h2) and uniqueness (u2)

<table>
<thead>
<tr>
<th>Item</th>
<th>F1 Teacher support</th>
<th>F2 Negative student interactions</th>
<th>F3 Positive student affiliation</th>
<th>F4 Unstructured classroom environment</th>
<th>h2</th>
<th>u2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>The teachers help us with problems</td>
<td>.78&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>.62</td>
<td>.38</td>
</tr>
<tr>
<td>6</td>
<td>The teachers are having time for us</td>
<td>.77</td>
<td></td>
<td></td>
<td>.58</td>
<td>.42</td>
</tr>
<tr>
<td>4</td>
<td>The teachers are helping me when I’m having difficulties with the lessons</td>
<td>.73</td>
<td></td>
<td></td>
<td>.55</td>
<td>.45</td>
</tr>
<tr>
<td>5</td>
<td>The teachers tell me when I’m doing fine</td>
<td>.70</td>
<td></td>
<td></td>
<td>.49</td>
<td>.51</td>
</tr>
<tr>
<td>2</td>
<td>The teachers are listening to us</td>
<td>.69</td>
<td></td>
<td></td>
<td>.55</td>
<td>.45</td>
</tr>
<tr>
<td>1</td>
<td>The teacher is kind</td>
<td>.63</td>
<td></td>
<td></td>
<td>.44</td>
<td>.56</td>
</tr>
<tr>
<td>7</td>
<td>The teachers often say ‘nice job’</td>
<td>.61</td>
<td></td>
<td></td>
<td>.40</td>
<td>.60</td>
</tr>
<tr>
<td>11</td>
<td>We are bullying each other in the classroom</td>
<td>.80</td>
<td></td>
<td></td>
<td>.65</td>
<td>.35</td>
</tr>
<tr>
<td>12</td>
<td>We are talking mean about each other in the classroom</td>
<td>.80</td>
<td></td>
<td></td>
<td>.63</td>
<td>.37</td>
</tr>
<tr>
<td>10</td>
<td>We call each other names in the classroom</td>
<td>.75</td>
<td></td>
<td></td>
<td>.56</td>
<td>.44</td>
</tr>
<tr>
<td>9</td>
<td>There is arguing in the classroom</td>
<td>.69</td>
<td></td>
<td></td>
<td>.57</td>
<td>.43</td>
</tr>
<tr>
<td>13</td>
<td>We are laughing at each other behind our back in the classroom</td>
<td>.66</td>
<td></td>
<td></td>
<td>.51</td>
<td>.49</td>
</tr>
<tr>
<td>8</td>
<td>Sometimes there will be beating and kicking in the classroom</td>
<td>.57</td>
<td></td>
<td></td>
<td>.32</td>
<td>.68</td>
</tr>
<tr>
<td>14</td>
<td>I like my classmates</td>
<td></td>
<td>.79</td>
<td></td>
<td>.64</td>
<td>.33</td>
</tr>
<tr>
<td>15</td>
<td>I have friends in my class</td>
<td></td>
<td>.65</td>
<td></td>
<td>.43</td>
<td>.57</td>
</tr>
<tr>
<td>16</td>
<td>In the classroom they like me</td>
<td></td>
<td>.64</td>
<td></td>
<td>.40</td>
<td>.60</td>
</tr>
<tr>
<td>17</td>
<td>My classmates are nice</td>
<td></td>
<td>.61</td>
<td></td>
<td>.40</td>
<td>.60</td>
</tr>
<tr>
<td>18</td>
<td>I like to work together with my classmates</td>
<td></td>
<td>.45</td>
<td></td>
<td>.23</td>
<td>.77</td>
</tr>
<tr>
<td>22</td>
<td>It is messy in the classroom</td>
<td></td>
<td></td>
<td></td>
<td>.71</td>
<td>.51</td>
</tr>
<tr>
<td>21</td>
<td>I cannot pay attention in the classroom</td>
<td></td>
<td></td>
<td></td>
<td>.66</td>
<td>.49</td>
</tr>
<tr>
<td>20</td>
<td>The class is never quiet</td>
<td></td>
<td></td>
<td></td>
<td>.58</td>
<td>.35</td>
</tr>
<tr>
<td>19</td>
<td>Students make a lot of noise in the classroom</td>
<td></td>
<td></td>
<td></td>
<td>.57</td>
<td>.44</td>
</tr>
</tbody>
</table>

Eigenvalues | 3.60 | 3.28 | 2.11 | 1.76 |
Explained variance (%) | 16  | 15  | 10  | 8   |

Note. Correlations between factors range from -.17 to .60 RMSEA = .057

<sup>1</sup> factor loadings less than .20 are not displayed
of an academic competence item was “I get good grades at school”; an example of an academic effort item was “I work hard at school.” Cronbach’s alphas were sufficient for both scales, with .84 and .87 for Academic Competence (four items) and Academic Effort (four items), respectively. Higher scale scores represent more academic competence and effort.

**Analysis**

To examine the internal structure of the SECCI, we first conducted an EFA using principal axis analysis in R (Revelle, 2016) with oblique (promax) rotation because we expected that the factors would be correlated. Subsequently, we examined both the bifactor (nested or general-specific) model (Wolff & Preising, 2005), using the Schmid–Leiman algorithm (Schmid & Leiman, 1957), account for unique variance above and beyond the variance accounted for by a general factor specified by all indicators (see Rios & Wells, 2014).

Finally, we analyzed the factor solution derived from the EFA by means of CFA in Mplus (Muthén & Muthén, 1998-2006). A multifactor model was specified—using the maximum likelihood estimator with robust standard errors (MLR) that accounts for violations of normality—in which each item loaded on only one factor, allowing very similarly worded items to correlate. Both the model’s chi-square and fit-indices, which are nonsensitive to sample size (comparative fit index [CFI], Tucker–Lewis index [TLI], standardized root mean square residual [SRMR], and root mean square error of approximation [RMSEA]), were used to evaluate model fit (Kline, 2016). The following fit index cutoff values are indicative of good model fit: CFI >.95, TLI >.95, and SRMR and RMSEA <.07 (Hu & Bentler, 1999; Kline, 2016; Steiger, 2007). Whereas a nonsignificant chi-square indicates exact model fit, a ratio between the chi-square statistic and the degrees of freedom (df) that is lower than 2.5 indicates a close fit to the data (Hu & Bentler, 1999). Subsequently, internal consistency reliabilities were assessed by means of ordinal Cronbach’s alpha because of the ordinal 3-point response format (Gadermann et al., 2012), and correlations were computed between all SECCI scales. Finally, convergent validity was examined by computing correlations between the SECCI scales and Academic Effort and Academic Competence.
RESULTS

Internal Structure and Reliability of the SECCI

EFA (see Table 1) yielded a four-factor structure, showing a satisfactory fit to the data (SRMR = .030; RMSEA = .057) explaining 49% of the variance, with four eigenvalues greater than 1: Factor 1, designated as Teacher Support, with an eigenvalue of 3.60 (16% explained variance); Factor 2, designated as Negative Student Interactions, with an eigenvalue of 3.28 (15% explained variance); Factor 3, designated as Positive Student Affiliation, with an eigenvalue of 2.11 (10% explained variance); and Factor 4, designated as Unstructured Classroom Environment, with an eigenvalue of 1.76 (8% explained variance). Factor loadings ranged between .45 and .80, whereas all cross loadings were below .20, with only five loadings between .10 and .17, and the remaining 51 (cross) loadings between 0 and .10. The four factors showed small to strong (significant) associations, ranging from $r = -0.18$ (between Negative Student Interactions and Positive Student Affiliations) to $r = 0.63$ (between Negative Student Interactions and Unstructured Classroom Environment). Notably, the factor Positive Student Affiliations was moderately associated with the factor Teacher Support, with $r = 0.44$.

Analysis of the bifactor model (see Appendix A and Table 2) did not support a single general factor, without the specific factors, explaining only 17% of the variance, with insufficient model fit (SRMR = .180; RMSEA = .151). There were five very small factor loadings between .13 and .20 (not displayed in Appendix A), six small factor loadings between .20 and .27, and 11 factor loadings beyond the conventional cutoff of .30. A brief version of the SECCI, based on general factor scores greater than .30, would primarily represent negative student interactions and unstructured classroom environment, which seems an underrepresentation of classroom climate from a theoretical point of view. In line with the larger general factor loadings for the negative classroom climate dimensions, the specific factors Negative Student Interactions and Unstructured Classroom Environment only marginally account for unique variance above and beyond the variance accounted for by a general factor, although the factor loadings of these specific factors remain satisfactory. Notably, the eigenvalues drop considerably to 1.10 (5% explained variance) and 0.80 (4% explained variance) for factors Negative Student Interactions and Unstructured Classroom Environment, respectively. Nevertheless, as a general factor for classroom climate does not fit the data well, and the four-factor model provides a good fit to the data, the four-factor model is supported in the EFAs.

Appendix B shows results of the hierarchical model, including a general factor accounting for the variance among the four empirically derived factors in EFA. However, this hierarchical model does not seem tenable, because the factor loadings of the general factor on the positive classroom dimensions are too small, with $r = -0.32$ for Teacher
Table 2 | Bi-factor Exploratory Factor Analysis of the SECCI: Standardized Loadings, communalities (h²) and uniqueness (u²)

<table>
<thead>
<tr>
<th>Item</th>
<th>G Teacher support</th>
<th>F1 Negative student interactions</th>
<th>F2 Positive student affiliation</th>
<th>F4 Unstructured classroom environment</th>
<th>h²</th>
<th>u²</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>We are bullying each other in the classroom</td>
<td>.66¹</td>
<td>.47</td>
<td>.65</td>
<td>.35</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>We are talking mean about each other in the classroom</td>
<td>.65</td>
<td>.47</td>
<td>.64</td>
<td>.36</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>There is arguing in the classroom</td>
<td>.63</td>
<td>.40</td>
<td>.57</td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>We call each other names in the classroom</td>
<td>.60</td>
<td>.42</td>
<td>.54</td>
<td>.46</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>We are laughing at each other behind our back in the classroom</td>
<td>.60</td>
<td>.38</td>
<td>.51</td>
<td>.49</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I cannot pay attention in the classroom</td>
<td>.52</td>
<td></td>
<td>.46</td>
<td>.48</td>
<td>.52</td>
</tr>
<tr>
<td>22</td>
<td>It is messy in the classroom</td>
<td>.51</td>
<td></td>
<td>.50</td>
<td>.51</td>
<td>.49</td>
</tr>
<tr>
<td>19</td>
<td>Students make a lot of noise in the classroom</td>
<td>.48</td>
<td>.15</td>
<td>.40</td>
<td>.44</td>
<td>.56</td>
</tr>
<tr>
<td>8</td>
<td>Sometimes there will be beating and kicking in the classroom</td>
<td>.45</td>
<td>.33</td>
<td></td>
<td>.31</td>
<td>.69</td>
</tr>
<tr>
<td>20</td>
<td>The class is never quiet</td>
<td>.42</td>
<td></td>
<td>.40</td>
<td>.35</td>
<td>.65</td>
</tr>
<tr>
<td>2</td>
<td>The teachers are listening to us</td>
<td>.36</td>
<td>-.67</td>
<td>.10</td>
<td></td>
<td>.57</td>
</tr>
<tr>
<td>14</td>
<td>I like my classmates</td>
<td>.27</td>
<td></td>
<td>-.76</td>
<td></td>
<td>.65</td>
</tr>
<tr>
<td></td>
<td>The teachers are having time for us</td>
<td>.26</td>
<td>-.73</td>
<td></td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td>4</td>
<td>The teachers are helping me when I’m having difficulties with the lessons</td>
<td>.25</td>
<td>-.70</td>
<td></td>
<td></td>
<td>.56</td>
</tr>
<tr>
<td>3</td>
<td>The teachers help us with problems</td>
<td>.25</td>
<td>-.75</td>
<td></td>
<td></td>
<td>.63</td>
</tr>
<tr>
<td>1</td>
<td>The teacher is kind</td>
<td>.23</td>
<td>-.59</td>
<td></td>
<td></td>
<td>.44</td>
</tr>
<tr>
<td>17</td>
<td>My classmates are nice</td>
<td>.23</td>
<td></td>
<td>-.57</td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>7</td>
<td>The teachers often say ‘nice job’</td>
<td>.20</td>
<td>-.56</td>
<td></td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>16</td>
<td>In the classroom they like me</td>
<td>.18</td>
<td></td>
<td>-.60</td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>18</td>
<td>I like to work together with my classmates</td>
<td>.16</td>
<td></td>
<td>-.42</td>
<td></td>
<td>.23</td>
</tr>
<tr>
<td>5</td>
<td>The teachers tell me when I’m doing fine</td>
<td>.15</td>
<td>-.63</td>
<td></td>
<td></td>
<td>.46</td>
</tr>
<tr>
<td>15</td>
<td>I have friends in my class</td>
<td>.13</td>
<td></td>
<td>-.63</td>
<td></td>
<td>.44</td>
</tr>
</tbody>
</table>

| Eigenvalues | 3.70 | 3.10 | 1.10 | 1.90 | 0.80 |
| Explained variance (%) | 17 | 14 | 5 | 9 | 4 |

¹ factor loadings less than .10 are not displayed General factor RMSEA = .151
Assessing Classroom Climate in Special Education

Support and −.28 for Positive Student Affiliation. Possibly, a hierarchical model with two higher order factors, representing the positive and negative dimensions of classroom climate does better account for the correlations between the four specific factors. We therefore conducted another EFA, which showed that these two, second order factors provided a better fit to the data, explaining 47% of the variance. Now, factor loadings were satisfactory: with Unstructured Classroom Environment and Negative Student Interactions loading .75 and .70 on negative classroom climate, respectively, and Teacher Support and Positive Student Affiliation loading .76 and .48 on positive classroom environment, respectively.

We subsequently tested the internal structure of the SECCI in CFA, based on a sufficient subject to free parameters and variables ratio approaching 5:1 and 15:1, respectively, for all CFA analyses, and a sufficiently large sample size to conduct CFA irrespective of these ratios (MacCallum, Widaman, Zhang, & Hong, 1999). Results showed a reasonable fit to the data (see Table 3, Model 1): χ² = 335.840 (df = 203), p < .001 (ratio 1.66, which is lower than 2.5); CFI = .943, TLI = .935, SRMR = .051, and RMSEA = .045. Allowing measurement errors to correlate among items showing similar wording (Items 3 and 4, “helping”) or content (Items 5 and 7, “reward”) further significantly improved model fit, which was eventually considered to be good (see Table 3, model 2): χ² = 286.817 (df = 201), p < .001 (ratio 1.43, which is lower than 2.5); CFI = .963 (Δ = .020), TLI = .958, SRMR = .049, and RMSEA = .036. Fitting a model to the data with the two higher order factors derived from the EFA (i.e., positive and negative classroom climate) did not yield a better fit to the data (see Table 3, Model 3), with a similar RMSEA and CFI as in the previous model, but showed a marginally lower Akaike information criterion (AIC), which suggests that the final model is equally valid or may even be preferred (Kline, 2016).

Table 4 presents the factor loadings of all items, ranging from .553 to .752 for Teacher Support, .568 to .811 for Negative Student Interactions, .480 to .815 for Positive Student Affiliation, and .592 to .689 for Unstructured Classroom Environment. Ordinal Cronbach’s alpha was good for all scales: Teacher Support, α = .93; Negative Student Interactions, α = .90; Positive Student Affiliation, α = .85; Unstructured Classroom Environment, α = .82.
Table 4 | SECCI Standardized Estimates (Loadings), Derived from CFA

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Scale/ Item</th>
<th>Standardized Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Teacher support</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>The teacher is kind</td>
<td>.655</td>
</tr>
<tr>
<td>2</td>
<td>The teachers are listening to us</td>
<td>.752</td>
</tr>
<tr>
<td>3</td>
<td>The teachers help us with problems</td>
<td>.774</td>
</tr>
<tr>
<td>4</td>
<td>The teachers are helping me when I’m having difficulties with the lessons</td>
<td>.710</td>
</tr>
<tr>
<td>5</td>
<td>The teachers tell me when I’m doing fine</td>
<td>.639</td>
</tr>
<tr>
<td>6</td>
<td>The teachers are having time for us</td>
<td>.755</td>
</tr>
<tr>
<td>7</td>
<td>The teachers often say ‘nice job’</td>
<td>.560</td>
</tr>
<tr>
<td></td>
<td><strong>Negative student interactions</strong></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sometimes there will be beating and kicking in the classroom.</td>
<td>.586</td>
</tr>
<tr>
<td>9</td>
<td>There is arguing in the classroom</td>
<td>.777</td>
</tr>
<tr>
<td>10</td>
<td>We call each other names in the classroom</td>
<td>.735</td>
</tr>
<tr>
<td>11</td>
<td>We are bullying each other in the classroom</td>
<td>.811</td>
</tr>
<tr>
<td>12</td>
<td>We are talking mean about each other in the classroom</td>
<td>.806</td>
</tr>
<tr>
<td>13</td>
<td>We are laughing at each other behind our back in the classroom</td>
<td>.725</td>
</tr>
<tr>
<td></td>
<td><strong>Positive student affiliation</strong></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I like my classmates</td>
<td>.815</td>
</tr>
<tr>
<td>15</td>
<td>I have friends in my class</td>
<td>.588</td>
</tr>
<tr>
<td>16</td>
<td>In the classroom they like me</td>
<td>.673</td>
</tr>
<tr>
<td>17</td>
<td>My classmates are nice</td>
<td>.761</td>
</tr>
<tr>
<td>18</td>
<td>I like to work together with my classmates</td>
<td>.480</td>
</tr>
<tr>
<td></td>
<td><strong>Unstructured classroom environment</strong></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Students make a lot of noise in the classroom</td>
<td>.623</td>
</tr>
<tr>
<td>20</td>
<td>The class is never quiet</td>
<td>.592</td>
</tr>
<tr>
<td>21</td>
<td>I cannot pay attention in the classroom</td>
<td>.689</td>
</tr>
<tr>
<td>22</td>
<td>It is messy in the classroom</td>
<td>.672</td>
</tr>
</tbody>
</table>

Table 5 presents the means and standard deviations of the SECCI scales and the two scales for academic self-concept, and all correlations among these scales. Correlations among the SECCI scales were all significant and in the expected direction, ranging $r = -0.15$ (positive student affiliation and unstructured classroom environment) and $r = 0.53$ (negative student interactions and unstructured classroom environment).

**Convergent Validity: Associations with Academic Effort and Academic Competence.** Convergent validity is demonstrated when the SECCI scales are significantly associated
with Academic Effort and Academic Competence. We found Teacher Support to have a positive and significant association with Academic Effort and Academic Competence: \( r = .28 \) and \( r = .26 \) (\( p < .001 \)), respectively. We also found Positive Student Affiliation to have a positive and significant association with Academic Effort and Academic Competence: \( r = .10 \) and \( r = .12 \) (\( p < .05 \)), respectively. Negative Student Interactions showed a negative and significant association with Academic Effort and Academic Competence: \( r = -.23 \) and \( r = -.20 \) (\( p < .01 \)), respectively. Finally, Unstructured Classroom Environment showed a negative and significant association with Academic Effort and Academic Competence: \( r = -.208 \) and \( r = -.159 \) (\( p < .05 \)), respectively. Given that all correlations were small, these results provide only marginal support for convergent validity of the SECCI.

**Table 5 |** Means. Standard Deviations and Correlations of all Classroom Climate and Academic Self-Concept.

<table>
<thead>
<tr>
<th>v1. Teacher support</th>
<th>M</th>
<th>SD</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.58</td>
<td>.51</td>
<td>1</td>
<td></td>
<td>-.25***</td>
<td>.37***</td>
<td>-.15**</td>
<td>.28***</td>
<td>.26***</td>
</tr>
<tr>
<td>v2. Negative student interactions</td>
<td>2.78</td>
<td>.68</td>
<td>1</td>
<td>-.19***</td>
<td>.53***</td>
<td>-.23***</td>
<td>-.20***</td>
<td></td>
</tr>
<tr>
<td>v3. Positive student affiliation</td>
<td>3.49</td>
<td>.55</td>
<td>1</td>
<td></td>
<td>-.15**</td>
<td>.10*</td>
<td>.12*</td>
<td></td>
</tr>
<tr>
<td>v4. Unstructured classroom environment</td>
<td>2.93</td>
<td>.66</td>
<td>1</td>
<td></td>
<td>-.21***</td>
<td>-.16**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v5. Academic effort</td>
<td>2.98</td>
<td>.91</td>
<td>1</td>
<td></td>
<td></td>
<td>.67***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v6. Academic competence</td>
<td>3.30</td>
<td>.88</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( N = 325 \) \* \( p < .05 \). ** \( p < .01 \). *** \( p < .001 \) (one-tailed significance)

**DISCUSSION**

This study was performed to examine the internal structure, convergent validity, and reliability of the SECCI in a group of adolescents and young adults in schools for special education in secure residential settings and youth prisons. Both exploratory and confirmatory factor analyses yielded a four-factor solution, with Teacher Support, Positive Student Affiliation, Negative Student Interactions, and Unstructured Classroom Environment as reliable dimensions. Moreover, significant but small associations between the SECCI scales and academic self-concept provided preliminary but weak support for the convergent validity of the SECCI. We therefore conclude that more research is necessary to obtain robust evidence to support the validity of the SECCI, with the prospect of using the SECCI to validly and reliably assess classroom climate in schools for special education in (secure) residential youth care settings and youth prisons. The SECCI can be used for several purposes. First, information on classroom
climate can be used by teachers and school psychologists as input for the discussion with students about their experiences with other students and their teacher to improve classroom climate (see Broh, 2002; Hattie & Timperly, 2007). Second, the SECCI makes it possible to measure progress in classroom climate and provides appropriate guidance on which dimensions to target by teachers and school psychologists (Pavletic, 2011; Ramelow et al., 2015). For example, if school psychologists establish that students experience negative student interactions, they may provide teachers with advice on how to stop negative student interactions and create a more positive classroom climate. Notably, there is some empirical evidence showing that a positive classroom climate can contribute to positive social and academic development of students in regular education (Anderson et al., 2004; Wissink et al., 2014). The SECCI can be used to examine whether the positive results from research on classroom climate in regular education can be generalized to classroom climate in residential special education schools. The correlations between the SECCI scales and academic self-concept were significant but low, providing only limited support for convergent validity of the SECCI. It is plausible to suggest that classroom climate may only partially contribute to academic self-concept of juveniles attending schools for special education in (secure) residential institutions, because academic selfconcept, to be distinguished from self-efficacy, is considered to be affected by several factors, in particular social comparative information and perceived evaluations and appraisals from significant others (Bong & Skaalvik, 2003). Notably, students attending special education in secure residential care often have a history of adverse and inconsistent care, having experienced extremely negative appraisals from significant others during extended periods of time (Souverein, Van der Helm, & Stams, 2013). It is therefore possible that their academic self-concept has become more trait-like than state-like, and therefore less susceptible for rehabilitative environmental influences, such as a positive classroom climate. Apart from this, social comparative information in the context of student relationships, in particular competition (Van der Helm et al., 2011), may affect academic self-concept too. Although many instruments assessing classroom climate assess competition among students (Altaf, 2015), this dimension is not assessed by the SECCI, which may explain the relatively small associations between the SECCI and academic self-concept. In further development of the SECCI, a scale assessing competition should be added, especially because children in secure institutions have difficulties in coping with competition (Van der Helm et al., 2011).

The main limitations of this study relate to characteristics of the sample. Although there are female students in schools of juvenile prisons, male students were overrepresented in these schools. Furthermore, there was no other validated classroom climate instrument available in the Netherlands for this population to compare with
the SECCI, and it was not possible to conduct behavioral observations of the classroom climate to establish convergent validity. Moreover, convergent validity was established by only assessing academic self-concept, showing low correlations, and without taking comparative discriminant evidence into account. Future validation studies of the SECCI should also examine associations with intrinsic and extrinsic learning motivation as well as internalizing (anxiety and depression) and externalizing (aggression and norm transgressive behavior) problems. Finally, no predictive validity and test–retest reliability could be established because the present study was cross-sectional.

The present study found preliminary evidence for validity and reliability of the SECCI in a group of adolescents in secure residential youth care and youth prisons attending special education classes. This study needs replication in future validation studies of the SECCI, which also assess classroom climate by means of observation and provide a more comprehensive assessment of validity, in particular establishing discriminant validity. Without discriminant evidence, it is difficult to correctly interpret the value of obtained convergent validity. We assume that repeated measurement of classroom climate, discussing the outcomes of the SECCI with teachers and students by school psychologists, and strengthening competencies and self-efficacy of teachers, informed by a valid and reliable assessment of teacher support, positive student affiliation, negative student interactions, and (un)structured classroom environment, can improve classroom climate and improve the educational and psychosocial outcomes for children at risk.


Assessing Classroom Climate in Special Education


Chapter 2

Appendix A | Bifactor model.

Appendix B | Hierarchical factor model.
Classroom Climate, Identification with School, and General Self-Worth Predict Academic Self-Concept in Students Attending Residential Schools for Special Education

ABSTRACT

Most youth in residential youth care institutions have a long history of adverse childhood experiences, and show (severe) emotional, behavioral, and academic problems. The present study used adolescent self-report questionnaires to examine associations between living group climate, classroom climate, identification with school, general self-worth and academic self-concept of students attending schools for special education in residential youth care institutions. The sample consisted of 184 adolescents (63.6% male, age $M = 16.40$, $SD = 1.99$) with severe emotional and behavioral problems. Results showed a weak association between living group climate and classroom climate, and somewhat stronger associations between classroom climate, identification with school and general self-worth on the one hand and academic self-concept on the other hand. We conclude that group workers and teachers should collaborate for the benefit of integrated care and education in residential youth care facilities.
INTRODUCTION

Reasons for residential youth care placement are, among other things, substantial problems in terms of social, behavioral, and school functioning, while living at home or in foster care is no option (Barth, 2002; Chor, McClelland, Weiner, Jordan, & Lyons, 2012; Whittaker, Del Valle, & Holmes, 2015). In the Netherlands, approximately 17,000 adolescents (“youth”) between the age of 12-18, who are in need of treatment and protection against themselves or their environment, live in institutions for open residential youth care (OYC), secure residential youth care (SYC) or forensic youth care (FYC) (Leloux-Opmeer, Kuiper, Swaab, & Scholte, 2016; Ter Beek, van der Rijken, Kuiper, Hendriks, & Stams, 2018). Most youth in residential youth care have a long history of child and youth care involvement, and show (severe) emotional, behavioral, social, and academic problems (Harder, Knorth & Zandberg, 2006; Kaal, Brand, & Van Nieuwenhuijzen, 2011; Van der Helm et al., 2013; Vreugdenhil, Doreleijers, Vermeiren, Wouters, & Van den Brink, 2004).

Every year approximately 2,200 adolescents are referred to OYC, SYC or FYC, which amounts to .07 percent of the 3 million youth in the Netherlands (CBS, 2017, p.8). The primary goal of these institutions is to prepare youth to return to society (De Valk, Kuiper, Van der Helm, Maas, & Stams, 2017). Institutions therefore should offer an environment in which youth can attain adolescent developmental tasks, such as developing supportive relationships with their peers and adults and starting to prepare for their future profession through successful formal education (De Valk et al., 2017; Roisman, Masten, Douglas Coatsworth, & Tellegen, 2004). Key to successful formal education is the development of a positive academic self-concept, which has been shown to be an important antecedent of academic achievement (Huang, 2011) and academic adjustment (Wouters, Germeijers, Colpin, & Verschueren, 2011).

Academic self-concept may be defined as ‘a student’s self-perception of academic ability formed through individual experiences and interactions with the environment’ (Rosen, Glennie, Dalton, Lennon, & Bozick, 2010, p. 118). The current study examines the association between individual experiences (identification with school and general self-worth) and interactions with the environment (perceived classroom climate) and academic self-concept of students who attend schools for special education in the institutions where they are living.

Identification with school and general self-worth

Most research on antecedents of academic self-concept is focused on academic achievement (Ghazvini, 2011; Ju, Zhang, & Katsiyannis, 2012; Marsh, Byrne, & Yeung, 1999). Only few studies examined psychological antecedents of academic self-concept
Chapter 3

(Trautwein, Lüdtke, Köller, & Baumer, 2006; Valentine & DuBois, 2005). Maras, Thompson, Gridley and Moon (2018) found strong correlations between students’ identification with school and general self-worth on the one hand and academic self-concept on the other hand.

Classroom climate

Classroom climate refers to the students’ perception of their proximal intellectual, physical, and social classroom environment in which students learn in terms of intellectual development, classroom structure, and quality of relationships among students and between students and teachers (Barr, 2016; Beld et al. 2017, 2018; McRobbie & Fraser, 1993). A positive and supportive classroom climate has been shown to be associated with better academic outcomes, such as improved math skills and literacy (Gietz & McIntosh, 2014). Moreover, it minimizes conflict in the classroom, increases socio-emotional growth, and fosters self-esteem (Steffgen, Recchia, & Viechtbauer, 2013; Van Ampt et al., 2000; Van der Ploeg, 2010; Veen, Vergeer, Van Oenen, Glaudé, & Breetvelt, 2007). On the contrary, a negative classroom climate could result in unfavorable comparisons of academic achievement among students, which are antagonistic to a positive academic self-concept (Pinxten et al., 2015). Moreover, a negative classroom climate could result in disruptive behavior, deteriorating learning accomplishments and an increasing amount of aggression among students (Barth, Dunlap, Dane, Lochman, & Wells, 2004). Therefore, it is plausible to suggest that classroom climate is positively associated with academic self-concept.

The relation between living group climate and classroom climate

Living group climate has recently been defined by Stams and Van der Helm (2017) as ‘the quality of the social and physical environment in terms of the provision of sufficient and necessary conditions for physical and mental health, well-being, contact and personal growth of the residents, with respect for their human dignity and human rights as well as (if not restricted by judicial measures) their personal autonomy, aimed at recovery and successful participation in society’ (p. 4). If staff at the living group is supportive and responsive to the needs of the youth, if there are possibilities for personal growth and autonomy, if there is a positive atmosphere among youth, and if repression is low or even absent, the living group climate is considered to be positive and therapeutic (Van der Helm, 2011; Van der Helm & Stams, 2017).

The characteristics of a positive and therapeutic living group climate are comparable with characteristics of a positive and supportive classroom climate. If teachers are supportive and responsive to the needs of the students, if there is positive student affiliation and little negative student behavior and little unstructured classroom
environment the classroom climate is considered to be positive and supportive (Beld et al., 2017). Nevertheless, the relation between living group climate and classroom climate has hardly been subject of empirical research. Interestingly, Harker, Dobel-Ober, Lawrence, Berridge and Sinclair (2003) found that youth spoke more positively about their school accomplishments when they felt supported by staff at the living group.

Recently, Beld et al. (2017) developed a measure to assess classroom climate in special education schools, consisting of the dimensions teacher support, negative student interactions, positive student affiliation, and unstructured classroom environment, which shows some similarities with Van der Helm et al.’s measure of living group climate, consisting of the dimensions support, growth, repression, and atmosphere (Van der Helm, Stams, & Van der Laan, 2011), in particular with respect to quality of relationships among adolescents and between adolescents and staff (i.e., teachers or group workers). However, growth and repression are lacking in the measure for residential classroom climate developed by Beld et al. (2017), while the dimension atmosphere of living group climate shows some commonalities with the student affiliation and interaction dimensions of residential classroom climate. The dimension structure only appears as a dimension of residential classroom climate.

It may be assumed that living group climate and classroom climate in schools for special education within residential institutions are associated because of three reasons: (a) the institutional social climate may affect living group climate and classroom climate in a similar way, (b) adolescents from the same living group may enter the same class as students; (c) positive or negative experiences with group members or staff at the living group may generalize to relationships among students and teachers in class, in particular because living group climate and classroom climate are largely shaped across comparable relationship dimensions, apart from opportunities for growth, repression, and (classroom) structure.

**Present study**

To date, there has been no study investigating the relation between living group climate, classroom climate, identification with school, general self-worth and academic self-concept in students who attend residential schools for special education in residential youth care institutions. The present study therefore examined the relation between living group climate, and consequences of repression in residential youth care. classroom climate, identification with school, general self-worth and academic self-concept in terms of perceived academic effort and competence (Maras, Moon, & Zhu, 2012) in students attending special education classes in residential youth care. We hypothesized that living group climate would be positively associated with classroom climate, and that classroom climate, identification with school, and general self-worth would be positively associated with academic self-concept.
METHOD

Participants
The present study was conducted in Dutch residential institutions for residential youth care (OYC, SYC and FYC) and internal schools for special education. The sample consisted of 184 youth (63.6% male) from seven institutions. Participants were aged between 11 and 24 years ($M = 16.40$, $SD = 1.99$) and 78.3% had a native Dutch background. The low education levels of the participants (i.e., primarily vocational training) and the ethnical diversity of the sample largely concur with characteristics of the Dutch (forensic) residential population (see Jeugdzorg Nederland, 2017; Smeets, 2011).

Procedure
Data were obtained from March 2013 until April 2014. All youth were asked whether they were willing to participate in this study. They voluntarily agreed to participate, signed an informed consent declaration, and were told that their answers would be treated confidentially and anonymously, and would be accessed only by the researchers. The participants received the questionnaire on paper, after receiving information about the study and instructions of the researcher and a student assistant. While filling out the questionnaires, youth could ask questions to the researcher. This study met all criteria (law, informed consent, data storage, anonymity) as stated in the participating institutions’ ethical conducts and the research code of conduct of the University of Applied Sciences Leiden (Andriessen, Onstenk, Delnooz, Smeijsters, & Peij, 2010). Participants completed the Prison Group Climate Inventory (PGCI), Special Education Classroom Climate Inventory (SECCI), and the scales Identification with school, General self-worth, Academic Competence, and Academic Effort of the About Me Questionnaire (AMQ).

Measures

Prison Group Climate Inventory (PGCI).
The PGCI (Van der Helm, Stams & Van der Laan, 2011) is an adolescent self-report questionnaire, which consists of 36 questions with a 5-point Likert-type scale, ranging from $1 = \text{don't agree}$ to $5 = \text{fully agree}$. Each question belongs to only one of the four dimensions of living group climate: support, growth, atmosphere, and repression. The scale Support ($\alpha = .92$) assesses the youth’s perception of support by staff. An example of an item is “Group workers treat me with respect.” The Growth scale ($\alpha = .90$) assesses developmental possibilities, hope for the future, and feelings and thoughts about the residential stay. An example item is “I learn the right things here.” The Repression scale ($\alpha = .62$) assesses repression, strictness of rules, and the restrictive control youth
experience during their imprisonment. An example of a repression item is “You have to ask permission for everything.” Finally, the Atmosphere scale (\( \alpha = .73 \)) assesses group atmosphere related to the youth’s own feelings of safety and trust. An example item is “We trust each other here” (Van der Helm et al., 2011). A therapeutic or open group climate is defined by high levels of support, ample opportunities for growth, minimal repression, and a positive group atmosphere among adolescents (Van der Helm et al., 2011).

**Special Education Classroom Climate Inventory (SECCI).** Classroom climate was measured with the Special Education Classroom Climate Inventory (SECCI; Beld et al., 2017), which consists of four scales. The questionnaire is composed of twenty-two items, rated on a 3-point Likert-scale (1 = I do not agree, 2 = I neither agree or disagree and 3 = I agree). The scale Teacher support (\( \alpha = .93 \)), assesses the responsiveness of teachers to specific needs of the students. Paying attention to students, taking complaints seriously, respect, and trust are important characteristics of teacher support. An example item is “The teachers are listening to us”. The scale Negative student interactions (\( \alpha = .90 \)), assesses negative student interactions in the classroom. An example item is “We call each other names in class”. The scale Positive student affiliation (\( \alpha = .85 \)), assesses positive student affiliation in the classroom. An example item is “I like to work together with my classmates”. The scale Unstructured classroom environment (\( \alpha = .73 \)), assesses the degree to which the classroom environment lacks structure. An example item is “The classroom is never quiet”.

**About Me Questionnaire (AMQ).** Academic effort and Academic competence Maras and colleagues (2018) developed scales to measure components of social identity, academic self-concept and general self-worth. A Dutch translation of the About Me Questionnaire was used (Maras, Thompson, Gridley, & Moon, 2018), assessing Identification with school, General self-worth, Academic effort (i.e., whether the student thinks he puts effort in school and whether he is willing to learn), and Academic competence (i.e., how capable the student thinks he is in the area of academic skills) using a four-point response format: 1 = ‘completely disagree’, 2 = ‘disagree more than agree’, 3 = ‘agree more than disagree’, 4 = ‘completely agree’. Some of the items were reformulated in a way that parents were renamed as social workers at the living group. In the present study, Cronbach’s alpha coefficients were good for all scales, with .61, .80, .88, and .88 for Identification with school, General self-worth, Academic Competence (four items), and Academic Effort (three items), respectively. Higher scale scores represent more identification with school, academic competence, and academic effort.
Statistical Analyses

First, we examined the associations between living group climate, classroom climate, identification with school, general self-worth, and academic self-concept by means of bivariate correlation analyses (Pearson’s $r$). Subsequently, we tested the study hypotheses in a structural equation model (see Figure 1), in which Living group climate was represented by a latent variable (consisting of support, growth, atmosphere, and repression), Classroom climate was represented by a latent variable (consisting of positive student affiliation, negative peer interactions, teacher support, and unstructured classroom environment), and Academic self-concept was represented by a latent variable (consisting of academic competence and academic effort). Identification with school and General self-worth were represented by observed variables.

We hypothesized a direct effect of Classroom climate, Identification with school, and General self-worth on Academic self-concept. Additionally, we specified a direct effect of living group climate on Classroom climate. Standardized coefficients of the direct and indirect effects can be interpreted as ‘small’ (.10 - .30), ‘medium’ (.30 - .50), or ‘large’ (> .50) effects (Cohen, 1992). Clustering of the data was handled by specifying the institution as a cluster variable. Maximum likelihood with robust standard errors (MLR) was used to estimate the model. Mplus software version 6.11 (Muthén & Muthén, 1997-2010) was used for the analyses. Modification indices, giving the expected drop in chi-square if the parameter in question is freely estimated, were used to improve model fit.

Exact model fit was calculated with a Chi-squared test. Because the Chi-squared test is sensitive to sample size, fit measures that are less sensitive to sample size were also used (Cheung & Rensvold, 2002): The Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI) and The Root Mean Square Error of Approximation (RMSEA). A non-significant Chi-square value is considered to indicate an exact fit to the data, while the following fit values indicate a close fit to the data: TLI > .95; CFI > .90; RMSEA ≤ .08 (Cheung & Rensvold, 2002).

RESULTS

Preliminary analyses

There was a very small proportion of missing values, ranging from 0 to 3.8% per variable. Little’s MCAR test ($\chi^2$ (3,200) = 3,193.11, $p = .531$) was non-significant, indicating that missing values were missing completely at random. Missing values were imputed by means of expectation maximization. Table 1 shows the means, standard deviations, and correlations among all study variables. Most correlations between living group climate and classroom climate were in the expected direction, but small and non-significant.
However, support showed a significant and negative correlation with unstructured classroom environment \( (r = -.25, p < .01) \), while group atmosphere was significantly and positively associated with teacher support \( (r = .24, p < .01) \), and negatively with negative peer interactions \( (r = -.21, p < .01) \), and unstructured classroom environment \( (r = -.27, p < .01) \). All living group climate dimensions were significantly and positively correlated with identification with school, academic competence and academic effort, except for repression (weak associations). No significant associations were found between the living group climate dimensions and general self-worth. Two dimensions of classroom climate were significantly and positively associated with identification with school (teacher support, \( r = .19, p < .05 \)) and general self-worth (positive student affiliation, \( r = .22, p < .05 \)), while all dimensions were significantly and weakly associated with both academic competence and academic effort, except for the non-significant association between positive student affiliation and academic competence (all associations were in the expected direction). Finally, identification with school and general self-worth were significantly and positively correlated with both academic competence and academic effort, showing moderate associations.

### Table 1 | Living Group Climate, Classroom Climate, Identification with School, General Self-Worth, and Academic Self-Concept: Averages, Standard Deviation and Correlations

<table>
<thead>
<tr>
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<th>M</th>
<th>SD</th>
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<th>10</th>
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<tr>
<td>Support (1)</td>
<td>3.22</td>
<td>0.90</td>
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<td>Growth (2)</td>
<td>3.25</td>
<td>1.05</td>
<td>.81**</td>
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<td>Repression (3)</td>
<td>3.41</td>
<td>0.62</td>
<td>-.46** -.48**</td>
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<tr>
<td>Atmosphere (4)</td>
<td>3.12</td>
<td>0.76</td>
<td>.68** .64** -.41**</td>
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<td>Teacher support (5)</td>
<td>2.50</td>
<td>0.64</td>
<td>.11</td>
<td>.11</td>
<td>-.08</td>
<td>.24**</td>
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<tr>
<td>Positive student affiliation (6)</td>
<td>2.53</td>
<td>0.59</td>
<td>.04</td>
<td>.03</td>
<td>-.07</td>
<td>.14</td>
<td>.46**</td>
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<tr>
<td>Negative peer interactions (7)</td>
<td>1.65</td>
<td>0.66</td>
<td>-.12</td>
<td>-.11</td>
<td>-.06</td>
<td>-.21** -.32** -.30**</td>
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<tr>
<td>Unstructured classroom environment (8)</td>
<td>1.83</td>
<td>0.67</td>
<td>-.25**</td>
<td>-.12</td>
<td>.05</td>
<td>-.27**</td>
<td>-.17*</td>
<td>-.20**</td>
<td>.37**</td>
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<td>Identification with school (9)</td>
<td>2.00</td>
<td>0.68</td>
<td>.16*</td>
<td>.15*</td>
<td>-.10</td>
<td>.21**</td>
<td>.19*</td>
<td>.07</td>
<td>-.05</td>
<td>-.03</td>
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<tr>
<td>General self-worth (10)</td>
<td>3.35</td>
<td>0.68</td>
<td>.00</td>
<td>.04</td>
<td>-.02</td>
<td>.11</td>
<td>.10</td>
<td>.22**</td>
<td>-.10</td>
<td>-.13</td>
<td>.17*</td>
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<tr>
<td>Academic competence (11)</td>
<td>2.98</td>
<td>0.86</td>
<td>.17*</td>
<td>.23**</td>
<td>-.04</td>
<td>.22**</td>
<td>.22**</td>
<td>.14</td>
<td>-.20**</td>
<td>-.18*</td>
<td>.39**</td>
<td>.51**</td>
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<tr>
<td>Academic effort (12)</td>
<td>2.92</td>
<td>0.90</td>
<td>.15*</td>
<td>.20**</td>
<td>-.04</td>
<td>.20**</td>
<td>.26**</td>
<td>-.16*</td>
<td>-.25**</td>
<td>-.25**</td>
<td>.46**</td>
<td>.35**</td>
<td>.64**</td>
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</tr>
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</table>

\( N = 184 \) ** \( p < .01 \). * \( p < .05 \) (two-tailed).
First, we examined a measurement model, consisting of the three latent variables living group climate, classroom climate, and academic self-concept. Model fit was acceptable: $\chi^2(32) = 58.75, p = .003$, CFI = .943, TLI = .919, RMSEA = .068 (95% CI = .040, .095). Model fit was improved by correlating residual variances between the indicators teacher support and positive student affiliation, which resulted in a good model fit: $\chi^2(31) = 37.71, p = .189$, CFI = .986, TLI = .979, RMSEA = .035 (95% CI = .000, .069). The structural model (Figure 1) also showed a good fit to the data: $\chi^2(50) = 66.64, p = .058$, CFI = .970, TLI = .961, RMSEA = .042 (95% CI = .000, .068). Living group climate was positively related to Classroom climate ($\beta = .296, p = .002$). Classroom climate ($\beta = .350, p < .001$), Identification with school ($\beta = .429, p < .001$), and General self-worth ($\beta = .451, p < .001$) were positively related to Academic self-concept (R squared = .57).

**DISCUSSION**

The goal of the present study was to examine the associations between living group climate, classroom climate, identification with school, general self-worth and academic self-concept as experienced by youth in residential youth care institutions. A weak association between living group climate and classroom climate was found, which
indicates that the living group and the residential classroom are rather distinct child-
rearing contexts. This implies that both contexts may exert unique influence on the
adolescents, which may affect both their socioemotional and educational development,
while adolescents’ experiences at the living group may to some extent spill over to the
classroom and vice versa. This means that the teacher must be able to understand the
behavior of the student from a broad contextual perspective, since classroom climate
is (partly) a reflection of what has taken place in the social context of the living group.
Therefore, communication between group workers and teachers who are involved with
the student seems important. Other studies also found that there is a need for intensive
collaboration between group workers at the living group and teachers at school for the
benefit of integrated care and education in residential youth care facilities (Gomez &
Ang, 2007; Van Dam et al., 2018).

Classroom climate, identification with school and general self-worth were positively
associated with academic self-concept. While identification with school and general
self-worth are personal (static) characteristics of the adolescents, classroom climate is
a contextual and dynamic characteristic that possibly can be changed through (brief)
interventions. There are several methods for improving classroom climate and living
group climate.

First, a ‘DMAIC-cycle’ (define, measure, analyze, improve and control; Pande, & Holpp,
2002) could be used to continuously monitor and improve both classroom climate and
living group climate, which stimulates individualized and integrated care and education
that is responsive to the needs of youth with emotional and behavioral disorders and/
or special educational needs (see, Stams & Van der Helm, 2017). Also, intervision and
supervision by a school psychologist may be used (Van Mieghem, Verschueren, Petry,
& Struyf, 2018).

Second, the use of video interaction, coaching and consultation may be used to
improve classroom climate through the stimulation of effective teacher behavior and
teacher-student relationship quality (Dekker, Biemans, & Eliens, 2015). The meta-analyses
by Roorda, Koomen, Spilt and Oort (2011) and Nurmi (2012) showed that teacher-
student relationship quality is strongly associated with students’ school engagement,
motivation, and achievement, while the meta-analysis by Cornelius-White (2007)
demonstrated that in particular learner centered teacher-student relationships are
associated with positive cognitive, affective, and behavioral student outcomes, which
may especially be important when dealing with students who are at risk of negative
student-teacher relationships, such as adolescents with emotional and behavioral

Third, Jennings and Greenberg (2009) showed that supportive teacher-student
relationships, effective classroom management, and successful social and emotional
learning program implementation contribute to a positive classroom climate, which requires teachers who have social and emotional competence and the knowledge and skills to adequately respond to the students’ social and emotional needs. For example, positive results have been obtained with Equip, a peer-helping approach to teach youth to think and act responsibly, which can be used to work on a positive peer culture in class (Van Stam et al., 2014).

Biesta (2013) distinguishes between three aims of education: qualification (i.e., the acquisition of knowledge and skills), socialization (i.e., becoming part of society, with its social conventions and traditions), and subjectification (i.e., becoming an autonomous and responsible person). These aims match the three basic needs of human self-determination, as described by Ryan and Deci (2000), that is, competence, relatedness, and autonomy. In the present study, we particularly focused on the association between classroom climate and academic self-concept, which is only one aspect of education (qualification) or self-determination (competence). Future studies should also examine the associations between classroom climate and aspects of moral climate (see Wissink et al., 2014), socialization/relatedness and subjectification/autonomy. These other outcomes may not only be related to academic achievement (e.g., Gaumer-Erickson, Noonan, Zheng, & Brussow, 2014; Ju, Zeng, & Landmark, 2017; Pen-Chiang Chou), but have also been shown to contribute to successful functioning and well-being of students in general (Ryan & Deci 2000).

The current study has some limitations. A first limitation is that results were based on student self-report questionnaires only. Questionnaire report of teachers and group workers from the residential youth care facility as well as observations could be a valuable addition to student self-report. A second limitation is that identification with school, general self-worth and academic self-concept were assessed with an instrument that was not validated for use in a Dutch population of youth attending special education classes. A third limitation is that the design of the study was cross-sectional instead of longitudinal, which sets limits to the causal interpretation of our results.

Despite its limitations, this study provides preliminary evidence showing that identification with school, general self-worth and classroom climate are related to academic self-concept of students attending special education in residential youth care. Moreover, this is the first study showing that living group climate proved to be related to classroom climate in residential youth care institutions. Future studies should examine the longitudinal associations between identification with school, general self-worth and classroom climate on the one hand and students’ competence (e.g., academic self-concept and achievement), relatedness (e.g., quality of relationships with peers and adults) and autonomy on the other hand in students attending special education classes in residential youth care institutions. The findings of this study offer an additional
impetus for quality improvement of special education classes in residential facilities for adolescents with (severe) emotional and behavioral problems.

ACKNOWLEDGEMENTS

The authors would like to thank all the youths who shared their experiences with us and the students, especially Francisca Schouten, who conducted all the questionnaires.
REFERENCES


Classroom Climate, Identification with School, and General Self-Worth Predict A students’ Academic Self-Concept


Chapter 3


Internal Structure and Reliability of the Special Education Classroom Climate Inventory-Revised: A Multilevel Confirmatory Factor Analysis

This study describes the development, factor structure, and reliability of the revised Special Education Classroom Climate Inventory (SECCI-R) in a construction sample of $N = 401$ students ($M$ age $= 15.27$, $71.4\%$ male), and a validation sample of $1,596$ students ($M$ age $= 14.55$, $78.2\%$ male) representing $255$ classes from $26$ schools for special education in The Netherlands. Multilevel CFA was used to examine the factor structure of the SECCI-R. A model with five correlating factors at the within- and between-group level showed a satisfactory fit to the data. Reliabilities of the scales were good. Our findings provide preliminary support for the factor structure and reliability of the SECCI-R in adolescents with emotional and behavioral problems attending special education classes. There is still a need for further development of the SECCI-R, while future replication studies should examine the factor structure of the SECCI-R, internal consistency and test-retest reliabilities of all scales, and finally convergent as well as criterion validity.
INTRODUCTION

In special education, teachers provide individualized instruction to students with severe emotional and behavioral problems or (intellectual) disabilities in small classes (Carman, Dorta, Kon, Martin, & Zarrilli, 2004). The students’ perception of their class in terms of classroom structure and quality of relationships among fellow students and teachers has been subsumed under the term classroom climate (Barr, 2016; McRobbie & Fraser, 1993). A positive classroom climate is considered a necessary condition for successful education and positive academic and social-emotional outcomes of students (Anderson, Hamilton, & Hattie, 2004; Wissink et al. 2014). Therefore, research on the antecedents and consequences of classroom climate seems important as well as the availability of instruments to monitor quality of classroom climate. However, few well-validated instruments exist to assess classroom climate.

The present study describes the development of the revised version of the Special Education Classroom Climate Inventory (SECCI; Beld et al., 2017), and examines its validity and reliability. The SECCI is a brief student self-report questionnaire designed to assess classroom climate in schools for secondary special education. The original SECCI assesses four dimensions of classroom climate, including Teacher support, Negative student interactions, Positive student affiliation, and Unstructured classroom environment. An initial validation study of the SECCI showed favorable psychometric properties of the SECCI (Beld et al., 2017).

The SECCI has been used as a tool for assessing and improving classroom climate in schools for secondary special education in residential treatment settings in the Netherlands. The aim of the revision of the SECCI-R was to adapt the measure for use in a broad spectrum of schools for special education, including non-residential schools for special education. The SECCI was revisited based on feedback from teachers, which led to the inclusion of the factor Growth, which is the degree to which the social environment provides the necessary conditions for positive youth development (Van der Helm, 2011). Additionally, some items of the SECCI have been modified to decrease their cognitive complexity.

One of the aims of student self-report of classroom climate is to generalize findings to the classroom level, because the perception of classroom climate varies across students, and classrooms vary in climate. Thus, the perceptions of classroom climate of students from the same class are expected to be more similar than the perception of students from different classes. Individual scores of classroom climate are often aggregated into a group score, which represents the mean score at the classroom level. However, regular factor analytic techniques do not take into account the nested nature of the data (e.g., students within classrooms). In regular (single level) factor analysis, observations
(students) are treated as independent (from different classrooms). Disregarding the multilevel structure may lead to an incorrect factor structure, because the covariance matrix is a blend of level-1 and level-2 relations, which has to be decomposed into a within-level and between-level covariance matrix (Hox, 2010).

In recent years, multilevel techniques have become available, which can be applied to factor analysis (Byrne, 2012). In multilevel factor analysis, the factor structure of a measure can be examined at both the within- and between-group level (Huang, 2017). Given the fact that the SECCI-R is used to assess classroom climate at the group level, multilevel factor analysis is needed to examine the factor structure of the SECCI-R at the between-group level in addition to the factor structure at the within-group level.

**Present study**

The purpose of the present study was to describe the development of the revised Special Education Classroom Climate Inventory (SECCI-R), and to examine the factor structure and reliability of the SECCI-R. First, a construction sample was used to examine the factor structure and reliability of the factors. Second, using a validation sample, the factor structure found in the construction sample was replicated. The larger sample size of the validation sample allowed us to use multilevel confirmatory factor analysis to examine the factor structure of the SECCI-R at the within- and between-group (i.e., classroom) level. Additionally, multiple group CFAs were conducted using the validation sample, to test several levels of measurement invariance across subgroups. Differences in perceived classroom climate for gender (boys versus girls) were examined because differences in interpretations of the items may occur because of gender-specific responses to social stress, that is, a fight/flight response in boys versus a befriending response in girls (Taylor et al., 2000), or gender differences in social information processing or social cognition in general (Adrian, Lyon, Oti, & Tininenko, 2010; McClure, 2000). Differences in perceived classroom climate between children (students under 13 years) and adolescents (students of 13 years and older) were examined because in the transition from childhood to adolescence peer relations in general become more important than relationships with adults, such as parents and teachers, while emotional and behavioral autonomy increase (Way & Greene, 2006). Differences in perceived classroom climate of students receiving education in public schools compared to students receiving education in schools affiliated with secure youth care facilities were examined, because coercion and restrictive measures (i.e., a degree of repressiveness) are often characteristics of residential youth care facilities (De Valk, Kuiper, Van der Helm, Maas, & Stams, 2016), which may also apply to schools in secure youth care facilities.
METHOd

Participants
First, a construction sample was used to test the factor structure of the SECCI-R and make changes to the instrument if necessary. During this stage, some items were revised, after which the factor structure was investigated using a larger validation sample. The ‘construction’ sample consisted of $N = 401$ students, $N = 282$ (71.4%) boys, $N = 113$ (28.2%) girls, six students did not provide information on their gender; mean age of respondents was 15.27 years ($SD = 2.52$, range = 12-22), and 32.4 % of the students had the Dutch nationality. The sample included youth from five schools for special education in the Netherlands. Students represented 56 classes with an average cluster size of 7.

The ‘validation’ sample consisted of $N = 1,596$ students, $N = 1,248$ (78.2%) boys, $N = 348$ (21.8%) girls; mean age of respondents was 14.55 years ($SD = 2.42$, range = 7-24), and 62.5 % of the students had the Dutch nationality. The sample included youth from 26 schools for special education in the Netherlands. Students represented 255 classes with an average cluster size of 6. The second sample included students from public schools for special education, schools associated with secure youth care (SYC) facilities, and schools associated with forensic youth care facilities (FYC). The sample from public schools consisted of $N = 1,109$ students (910 boys and 199 girls; $M$ age = 13.75 years), representing 150 classes from 13 schools. The sample from SYC facilities consisted of $N = 340$ students (194 boys and 146 girls; $M$ age = 15.56 years), representing 61 classes from 7 schools. The sample from FYC facilities consisted of $N = 147$ students (144 boys and 3 girls; $M$ age = 18.40 years), representing 45 classes from 6 schools.

Procedure
Schools were selected to represent a wide range of schools in Dutch special education in order to enhance generalizability of results. Data were obtained in March and April 2015 for the construction sample, and from September 2016 until November 2017 for the validation sample. All students participated voluntarily and signed an informed consent form. Students were informed about the purpose of the study, anonymous data-processing, and that teachers and other staff members would not have access to their answers. Participants did not receive a compensation for their participation in the study.

Measures
The Special Education Classroom Climate Inventory (SECCI; Beld et al., 2017) was designed to use with students showing conduct problems and low cognitive levels or mild intellectual disability. Beld et al. (2017) developed the SECCI, consisting of 22 items with 4 scales rated on three-point answering categories, ranging from $1 = 'I do not agree'$
to 2 ‘I neither agree or disagree’ and 3 = ‘I agree’. The scale Teacher support consists of 7 items, Negative student interactions of 6 items, Positive student affiliation of 5 items, and Unstructured classroom environment of 4 items.

Based on feedback from professionals in special education, several changes were made to further develop the measure. The most important change was the inclusion of five items to measure growth. Further, the items referring to Teacher support were modified, such that the wording was changed from teachers to teacher. Also, the items of the factor Unstructured classroom environment were modified, such that all items were positively formulated. Consequently, the factor was renamed as Structured classroom environment, and the rating on all scales, based on a three-point answering category, was changed in a rating scale based on a five-point answering category.

The above resulted in a revised version of the SECCI, the SECCI-R, consisting of 21 items representing five scales. The Teacher support scale (5 items) assesses the responsiveness of teachers to specific needs of their students. Communicating with students, giving feedback, activity, stimulation, paying attention to students, taking complaints seriously, respect, and trust are important characteristics of Teacher support. The Positive student affiliation scale (4 items) assesses Positive student affiliations in the classroom. The Structured classroom environment scale (4 items) assesses the degree to which basic conditions are created that enable students to focus their attention on learning. The Negative student interactions scale (4 items) assesses negative interactions among students. The Growth scale (4 items) assesses the degree to which students believe they are learning and are able to develop in the classroom. Examples of the items are presented in Appendix 1. Note that, due to the modifications of some of the items of the SECCI-R that were used in the validation sample, the items in the construction and validation sample are somewhat different from each other regarding the number of items per scale and the formulation of the items. Higher scale scores are indicative of more Teacher support, Growth, Positive student affiliation, Structured classroom environment, and Negative student interactions. All items were rated on a five-point Likert type scale, ranging from 1 (I do not agree), 2 (I somewhat disagree) to 3 (in between), 4 (I somewhat agree), and 5 (I totally agree). Each item belongs to only one of the five scales for classroom climate. One item of the Growth scale was reverse-scored, meaning that a higher score represents a negative outcome.

**Statistical analyses**

First, necessary assumptions were checked (missing data and normality). Also, intraclass correlations (ICCs) of the items were computed, to examine the amount of variability between groups (i.e., between classes), and the degree of non-independence of the data (Raudenbusch & Bryk, 2002). ICCs greater than zero are indicative of nested data
The factor structure was examined by means of multilevel confirmatory factor analysis (MCFA), using Mplus software, version 6.12 (Múthen & Múthen, 1998-2012). First, the between-group and within-group covariance matrices were computed using full maximum likelihood estimation (FIML). Then, a single-level CFA was conducted using the within-group covariance matrix to examine the hypothesized model. A five-factor model was specified in which each item loaded on only one factor. To account for non-normally distributed data, the robust maximum likelihood estimation procedure (MLR) was chosen (Muthén & Muthén, 1998-2012).

Next, several multilevel measurement models were specified, such as a five-factor model at each level, and a five-factor model at level-1 and fewer factors at level-2. The rationale for looking at different models was that previous studies using MCFA have found a smaller number of level-2 factors relative to level-1 (Hox, 2010). In MCFA models, negative residual variance at level-2 is a common problem, which can result in non-convergence of the model (Kim, Dedrick, Cao, & Ferron, 2016). During the analyses, we did not encounter convergence problems or inadmissible solutions due to negative residual variance at level-2. Prior to specification of the MCFA measurement model, one item of the Growth factor was recoded, such that for all items a higher score indicated a positive outcome. Research on MCFA has found that reverse scored items may cause convergence problems (Gustafson & Stahl, 2005). The syntaxes used in the present study are available at the reader’s request.

We conducted a series of multiple group confirmatory factor analyses to test configural, metric, and scalar invariance across gender, age and type of facility (open schools versus schools in secure care facilities), using the validation sample. The purpose of testing configural invariance between subgroups was to justify using the total validation sample in specifying a multilevel factor model, such that the factor structure would be comparable across groups. The purpose of testing scalar invariance was to examine differences in latent means between groups, for which scalar invariance is required.

Multiple group CFA was conducted to test measurement invariance. We followed the procedures outlined by Van de Schoot, Lugtig, and Hox (2012). The total covariance matrix was used in the multiple group analyses, and the ‘Type = complex’ option in Mplus was used to account for nested data, using class as a cluster variable. To the best of our knowledge, there currently are no methods to test for measurement invariance using only the within-group covariance matrix, because it is not possible to include a grouping variable in a within-group covariance matrix. First, two separate models were fitted for each group. Then, an unconstrained multiple group model was fitted to examine configural invariance. In this model, the factor variances were fixed to 1 and the factor means were fixed to 0 in each group for identification, and all item
loadings and intercepts were freely estimated. The residual variances of all items were freely estimated in both groups. In the second step, a model was fitted with loadings constrained to be equal across groups (metric invariance). The factor variances were fixed to 1 in the reference group, and were freely estimated in the other group, while the factor means were held equal across groups. The reference groups were boys, children aged 13 years and above, and children from public schools, respectively. In the third step, a model was fitted in which intercepts were constrained to be equal across groups, but loadings were freely estimated (intercept-only invariance). This model tests whether the meaning of the intercepts of the items are equal in both groups. Finally, a model was fitted with loadings and intercepts constrained to be equal across groups to examine scalar invariance. In the reference group, the factor variances and means were fixed to 1 and 0, respectively, but freely estimated in the other group.

Model fit was evaluated by various model fit indices; comparative fit index (CFI), Tucker-Lewis index (TLI), the root mean square residual (RMSEA), and the standardized root mean residual (SRMR). For the MCFA models, the SRMR at the within-group level (SRMRW) and between-group-level (SRMRB) were also examined. Cut off values of CFI > .95, TLI > .95, RMSEA < 0.05, and SRMR < .08 are required for good model fit, and values of CFI > .90, TLI > .90, RMSEA < 0.08, and SRMR < .10 are indicative of acceptable model fit (Hu & Bentler, 1999; Kline, 2015). To compare different models, the Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used. Smaller AIC and BIC values are indicative of better fitting models (Preacher et al., 2013). Also, change in CFI (Δ CFI) was used to examine change in model fit of multiple group analyses. A change in CFI by .01 or more is indicative of non-invariance between groups (Cheung & Rensvold, 2002).

Reliability analyses (Cronbach’s alpha) were conducted using the “mcfa.input”function and syntax (Huang, 2017) in the R environment (version 3.4.1; R Core Team, 2017). This function generates the within- and between-group covariance matrices and allows computation of Cronbach’s alpha for level-1 factors (using the within-group covariance matrix) and level-2 factors (using the adjusted between-group covariance matrix).

**RESULTS**

**Missing data**

In the construction sample, missing values for the individual SECCI items ranged between zero and 10 (2.5%). Little’s MCAR test ($\chi^2 (621) = 730.76, p = .002$) indicated that missing data were not completely at random. In the validation sample, 1,596 students, 148 (9.3%) had at least one missing value. Missing values for the individual SECCI items ranged between five (0.3%) and 22 (1.4%). Little’s MCAR test ($\chi^2 (753) = 869.83, p = .002$)
was significant, indicating that missing values were not missing completely at random. By inspecting the data, it seemed that the proportion of missing data was very small, and that there were no systematic missing values on particular items. Further, examination of the missing data patterns indicated that the data was missing at random.

Descriptive statistics of all items are depicted in Appendix 1. In the construction sample, one item (‘School is important for a good future’, \( M = 4.54 \)) was negatively skewed. Also, the ICC of this item was relatively low (.035). A possible explanation for the low ICC could be the formulation of the item, referring to the school instead of the classroom. This item was not included in the item pool for the validation sample. In the validation sample, skewness and kurtosis values for all items were within an acceptable range. ICCs ranged between .03 and .24 in the construction sample, and between .08 and .32 in the validation sample. Some negatively worded (i.e., inverse or reversed) items, directionally opposed to the meaning of the construct (e.g., by using a negation), from the factor Unstructured classroom environment in the construction sample had relatively low ICCs. In the validation sample, all items of this factor had been modified into positively worded items, resulting in the factor Structured classroom environment, because professionals in special education (e.g., teachers) argued that positively worded questionnaire items would be easier to comprehend by their students, especially those with lower cognitive abilities: see Salazar (2015) and Suarez-Alvarez et al. (2018) for a discussion on using negatively worded items in scales. Notably, the modified items showed larger ICCs in the validation sample than in the construction sample.

**Confirmatory factor analysis: construction sample**

First, a single level CFA was conducted using the within-group covariance matrix. A five-factor model was specified, consisting of Teacher support, Positive student affiliation, Unstructured classroom environment, Negative student interactions, and Growth. Initial fit of the model was acceptable: \( \chi^2 (220) = 444.98; p < .001, \) CFI = .921, TLI = .909, RMSEA = .050 (90% CI = .044, .057), SRMR = .056. Standardized factor loadings ranged from .36 to .82 for positively worded items, and -.25 for one negatively worded item (See Appendix 2). We then tested a model with a second order factor overall classroom climate, which demonstrated a decline in model fit: \( \chi^2 (225) = 544.17; p < .001, \) CFI = .887, TLI = .873, RMSEA = .059 (90% CI = .053, .066), SRMR = .082. We also tested a bifactor (hierarchical) model, which also demonstrated a poor fit to the data: \( \chi^2 (207) = 480.69; p < .001, \) CFI = .903, TLI = .882, RMSEA = .057 (90% CI = .053, .066), SRMR = .074.

Reliability was good, with Cronbach’s alpha for Teacher support \( \alpha = .89, \) Growth \( \alpha = .67, \) Unstructured classroom environment \( \alpha = .66, \) Positive student affiliation \( \alpha = .82, \) and Negative student interactions \( \alpha = .83. \) The correlations between the factors were small to moderate and in the expected direction (Table 1).
### Appendix 1 | Descriptive Statistics of the SECCI-R items (Construction Sample)

<table>
<thead>
<tr>
<th>Item</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>skewness</th>
<th>kurtosis</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like my classmates</td>
<td>398</td>
<td>4.05</td>
<td>1.05</td>
<td>-0.907</td>
<td>0.151</td>
<td>.156</td>
</tr>
<tr>
<td>2. I have friends in my class</td>
<td>396</td>
<td>4.22</td>
<td>1.11</td>
<td>-1.428</td>
<td>1.165</td>
<td>.056</td>
</tr>
<tr>
<td>3. My classmates are nice to me</td>
<td>394</td>
<td>4.09</td>
<td>1.01</td>
<td>-1.047</td>
<td>0.649</td>
<td>.066</td>
</tr>
<tr>
<td>4. My classmates are entertaining</td>
<td>392</td>
<td>3.69</td>
<td>1.25</td>
<td>-0.659</td>
<td>-0.559</td>
<td>.128</td>
</tr>
<tr>
<td>5. Classmates are beating and kicking in the classroom</td>
<td>391</td>
<td>2.02</td>
<td>1.34</td>
<td>0.998</td>
<td>-0.431</td>
<td>.144</td>
</tr>
<tr>
<td>6. Classmates are bullying each other in the classroom</td>
<td>399</td>
<td>2.19</td>
<td>1.29</td>
<td>0.623</td>
<td>-0.951</td>
<td>.135</td>
</tr>
<tr>
<td>7. Classmates are arguing with each other in the classroom</td>
<td>397</td>
<td>2.69</td>
<td>1.40</td>
<td>0.211</td>
<td>-1.261</td>
<td>.125</td>
</tr>
<tr>
<td>8. We call each other names in the classroom</td>
<td>396</td>
<td>2.54</td>
<td>1.40</td>
<td>0.345</td>
<td>-1.216</td>
<td>.118</td>
</tr>
<tr>
<td>9. We bully each other in the classroom</td>
<td>395</td>
<td>2.06</td>
<td>1.27</td>
<td>0.846</td>
<td>-0.551</td>
<td>.094</td>
</tr>
<tr>
<td>10. The teachers teach well</td>
<td>393</td>
<td>3.92</td>
<td>1.22</td>
<td>-0.947</td>
<td>-0.068</td>
<td>.186</td>
</tr>
<tr>
<td>11. The teachers listen to my opinion</td>
<td>397</td>
<td>3.80</td>
<td>1.27</td>
<td>-0.820</td>
<td>-0.417</td>
<td>.240</td>
</tr>
<tr>
<td>12. The teachers support me when I'm having problems</td>
<td>394</td>
<td>3.93</td>
<td>1.26</td>
<td>-0.964</td>
<td>-0.194</td>
<td>.215</td>
</tr>
<tr>
<td>13. The teachers help me when I'm having difficulties</td>
<td>395</td>
<td>4.07</td>
<td>1.19</td>
<td>-1.174</td>
<td>0.388</td>
<td>.163</td>
</tr>
<tr>
<td>14. The teachers compliment me when I am doing a 'nice job'</td>
<td>396</td>
<td>3.98</td>
<td>1.22</td>
<td>-1.061</td>
<td>0.142</td>
<td>.181</td>
</tr>
<tr>
<td>15. My classmates make a lot of noise in the classroom</td>
<td>394</td>
<td>3.49</td>
<td>1.25</td>
<td>-0.453</td>
<td>-0.784</td>
<td>.137</td>
</tr>
<tr>
<td>16. The class is never quiet</td>
<td>397</td>
<td>3.09</td>
<td>1.34</td>
<td>-0.105</td>
<td>-1.073</td>
<td>.077</td>
</tr>
<tr>
<td>17. I cannot pay attention in the classroom</td>
<td>397</td>
<td>2.75</td>
<td>1.44</td>
<td>0.203</td>
<td>-1.277</td>
<td>.033</td>
</tr>
<tr>
<td>18. It is messy in the classroom</td>
<td>398</td>
<td>2.57</td>
<td>1.37</td>
<td>0.333</td>
<td>-1.115</td>
<td>.120</td>
</tr>
<tr>
<td>19. I don't learn anything at this school</td>
<td>399</td>
<td>2.51</td>
<td>1.56</td>
<td>0.445</td>
<td>-1.365</td>
<td>.114</td>
</tr>
<tr>
<td>20. What I'm learning here is good for my future</td>
<td>397</td>
<td>3.71</td>
<td>1.36</td>
<td>-0.738</td>
<td>-0.701</td>
<td>.130</td>
</tr>
<tr>
<td>21. I'm learning the right things at school</td>
<td>396</td>
<td>3.85</td>
<td>1.29</td>
<td>-0.934</td>
<td>-0.206</td>
<td>.206</td>
</tr>
<tr>
<td>22. School is important for a good future</td>
<td>401</td>
<td>4.54</td>
<td>0.94</td>
<td>-2.278</td>
<td>4.745</td>
<td>.035</td>
</tr>
<tr>
<td>23. I'm making progress at school</td>
<td>393</td>
<td>4.06</td>
<td>1.05</td>
<td>-1.146</td>
<td>0.877</td>
<td>.122</td>
</tr>
</tbody>
</table>
### Appendix 2 | Standardized Factor Loadings of the SECCI-R (Construction Sample)

<table>
<thead>
<tr>
<th>Scale/Item</th>
<th>Standardized Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher support</strong></td>
<td></td>
</tr>
<tr>
<td>The teachers teach well</td>
<td>.790</td>
</tr>
<tr>
<td>The teachers listen to my opinion</td>
<td>.785</td>
</tr>
<tr>
<td>The teachers support me when I'm having problems</td>
<td>.729</td>
</tr>
<tr>
<td>The teachers help me when I'm having difficulties</td>
<td>.696</td>
</tr>
<tr>
<td>The teachers compliment me when I am doing a 'nice job'</td>
<td>.619</td>
</tr>
<tr>
<td><strong>Growth</strong></td>
<td></td>
</tr>
<tr>
<td>What I'm learning here is good for my future</td>
<td>.625</td>
</tr>
<tr>
<td>I'm learning the right things at school</td>
<td>.821</td>
</tr>
<tr>
<td>School is important for a good future</td>
<td>.362</td>
</tr>
<tr>
<td>I'm making progress at school</td>
<td>.545</td>
</tr>
<tr>
<td>I don't learn anything at this school</td>
<td>-.245</td>
</tr>
<tr>
<td><strong>Unstructured classroom atmosphere</strong></td>
<td></td>
</tr>
<tr>
<td>My classmates make a lot of noise in the classroom</td>
<td>.656</td>
</tr>
<tr>
<td>The class is never quiet</td>
<td>.554</td>
</tr>
<tr>
<td>I cannot pay attention in the classroom</td>
<td>.458</td>
</tr>
<tr>
<td>It is messy in the classroom</td>
<td>.575</td>
</tr>
<tr>
<td><strong>Positive student affiliation</strong></td>
<td></td>
</tr>
<tr>
<td>I like my classmates</td>
<td>.779</td>
</tr>
<tr>
<td>I have friends in my class</td>
<td>.640</td>
</tr>
<tr>
<td>My classmates are nice to me</td>
<td>.714</td>
</tr>
<tr>
<td>My classmates are entertaining</td>
<td>.732</td>
</tr>
<tr>
<td><strong>Negative student interactions</strong></td>
<td></td>
</tr>
<tr>
<td>Classmates are beating and kicking in the classroom</td>
<td>.551</td>
</tr>
<tr>
<td>Classmates are bullying each other in the classroom</td>
<td>.612</td>
</tr>
<tr>
<td>Classmates are arguing with each other in the classroom</td>
<td>.741</td>
</tr>
<tr>
<td>We call each other names in the classroom</td>
<td>.762</td>
</tr>
<tr>
<td>We bully each other in the classroom</td>
<td>.688</td>
</tr>
</tbody>
</table>
Table 1 | Reliability, Descriptive statistics, and Correlations for SECCI Scales (Construction Sample)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Reliability</th>
<th>Descriptives</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher support (1)</td>
<td>.888</td>
<td>392</td>
<td>3.950</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.033</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.587**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.285**</td>
</tr>
<tr>
<td>Growth (2)</td>
<td>.651</td>
<td>394</td>
<td>3.785</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.919</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.288**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.286**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.172**</td>
</tr>
<tr>
<td>Unstructured classroom atmosphere (3)</td>
<td>.654</td>
<td>392</td>
<td>2.985</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.943</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.289**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.485**</td>
</tr>
<tr>
<td>Positive student affiliation (4)</td>
<td>.816</td>
<td>392</td>
<td>4.024</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.883</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-.232**</td>
</tr>
<tr>
<td>Negative student interaction (5)</td>
<td>.789</td>
<td>392</td>
<td>2.357</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.065</td>
</tr>
</tbody>
</table>

**p < .01.

Confirmatory factor analysis: validation sample

First, a single level CFA was conducted, using the within-group covariance matrix. A five-factor model was specified, consisting of Teacher support, Positive student affiliation, Structured classroom environment, Negative student interactions, and Growth. Fit of the model was acceptable: χ² (179) = 924; p < .001, CFI = .949, TLI = .940, RMSEA = .052 (90% CI = .049, .056), SRMR = .050. Results indicated one cross-loading item (item 14, 'students are too loud during class') on the factor Negative student interactions. This item demonstrated a modification index (M.I.) of 207, whereas the range of the M.I. of other items was between 13 and 50. Item 14 was initially specified as an indicator (reverse scored) of the factor Structured classroom environment (standardized loading = -.33). By respecifying the model with item 14 loading onto the factor Negative student interactions (standardized loading = .49), model fit improved, resulting in a good fit: χ² (179) = 749; p < .001, CFI = .961, TLI = .954, RMSEA = .046 (90% CI = .042, .049), SRMR = .040.

Multilevel confirmatory factor analysis

Next, we conducted multilevel confirmatory factor analyses, using the validation sample (for all MCFA models, see Table 2). Notably, prior to the specification of the MCFA models, a series of measurement invariance tests was conducted to test for configural, metric, and scalar invariance. These results are presented in a later section. The purpose of testing configural invariance between different groups was to justify using the total sample in specifying a multilevel factor model, such that the proposed factor structure would be comparable across groups. Configural invariance was demonstrated in all measurement invariance analyses.

A model with five correlated factors at the within-group level and five correlated factors at the between-group level showed an acceptable fit to the data: χ² (358) = 1,129;
Standardized factor loadings ranged from .45 to .89 for within-level factors, and from .82 and .99 for between-level factors, except for one item of the Positive student affiliation factor (.57). This particular item (‘I have friends in my class’) also demonstrated a non-significant percentage of explained variance at the between-group level (32% compared to > 68% of other items). After removing this item, model fit improved: $\chi^2 (320) = 1,022; p < .001$, $\text{CFI} = .953$, $\text{TLI} = .944$, $\text{RMSEA} = .037$, $\text{SRMR}_w = .040$, $\text{SRMR}_b = .105$. Further improvement of model fit was achieved by allowing residual variances of similar worded items to correlate (e.g., ‘Classmates are bullying each other in the classroom’ and ‘Classmates are arguing with each other in the classroom’). The final model resulted in a good fit: $\chi^2 (314) = 803; p < .001$, $\text{CFI} = .967$, $\text{TLI} = .960$, $\text{RMSEA} = .031$, $\text{SRMR}_w = .035$, $\text{SRMR}_b = .080$. Standardized factor loadings ranged from .45 to .89 for within-level factors, and from .72 and .99 for between level factors (See Appendix 3).

Reliabilities of the factors were good, with Cronbach’s alpha at the within-level for Teacher support $\alpha = .87$, Growth $\alpha = .80$, Structured classroom environment $\alpha = .77$, Positive student affiliation $\alpha = .84$, Negative student interactions $\alpha = .76$, and between-level alpha’s of .98, .97, .93, 97, and .96, respectively.

The correlations between the level-1 factors were small to moderate and in the

<table>
<thead>
<tr>
<th>Multilevel CFA models</th>
<th>$\chi^2$(df)*</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>$\text{SRMR}_w$</th>
<th>$\text{SRMR}_b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 factors within /1 factor between</td>
<td>1,372 (368)</td>
<td>.937</td>
<td>.928</td>
<td>.041</td>
<td>.050</td>
<td>.288</td>
</tr>
<tr>
<td>5 factors within /2 factors betweena</td>
<td>1,320 (367)</td>
<td>.940</td>
<td>.931</td>
<td>.040</td>
<td>.042</td>
<td>.206</td>
</tr>
<tr>
<td>5 factors within /3 factors betweenb</td>
<td>1,210 (365)</td>
<td>.947</td>
<td>.939</td>
<td>.038</td>
<td>.041</td>
<td>.152</td>
</tr>
<tr>
<td>5 factors within /4 factors betweenc</td>
<td>1,195 (362)</td>
<td>.948</td>
<td>.939</td>
<td>.038</td>
<td>.040</td>
<td>.135</td>
</tr>
<tr>
<td>5 factors within /5 factors between</td>
<td>1,129 (358)</td>
<td>.951</td>
<td>.943</td>
<td>.037</td>
<td>.040</td>
<td>.105</td>
</tr>
<tr>
<td>5 factors within /5 factors between and modifications</td>
<td>802 (314)</td>
<td>.967</td>
<td>.960</td>
<td>.031</td>
<td>.035</td>
<td>.080</td>
</tr>
</tbody>
</table>

Note. * All chi-square values are statistically significant at $p < .001$.

$\chi^2 =$ Chi-square; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; $\text{SRMR}_w =$ SRMR within-group; $\text{SRMR}_b =$ SRMR between-group.

a Two factors at the between-level: one factor consisting of items referring to teacher support, growth and structured classroom environment, and one factor consisting of items referring to interactions among students.
b Three factors at the between-level: one factor consisting of items referring to teacher support and growth, one factor consisting of items referring to structured classroom environment and positive student interactions, and one factor consisting of items referring to negative student interactions.
c Four factors at the between-level: one factor consisting of items referring to teacher support and growth, one factor consisting of items referring to structured classroom environment, one factor consisting of items referring to positive student interactions, and one factor consisting of items referring to negative student interactions.
expected direction (Table 3). Teacher support was positively and significantly correlated
with Growth, Structured classroom environment, and Positive student affiliation (range
$r = .36$ to $.58$), and negatively correlated with Negative student interactions ($r = -.19$).
Growth, Structured classroom environment, and Positive student affiliation were also
positively correlated with each other (range $r = .30$ to $.49$), and negatively correlated
with Negative student interactions (range $r = -.14$ to -.43). The correlations between the
level-2 factors were to moderate to strong and in the expected direction (Table 3).

**Appendix 3 | Standardized Factor Loadings of the SECCI-R (Validation Sample)**

<table>
<thead>
<tr>
<th>Scale/ item</th>
<th>Standardized factor loading Level-1</th>
<th>Standardized factor loading Level-2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My teacher teaches well</td>
<td>.731</td>
<td>.970</td>
</tr>
<tr>
<td>My teacher listens to my opinion</td>
<td>.805</td>
<td>.964</td>
</tr>
<tr>
<td>My teacher supports me when I'm having problems</td>
<td>.796</td>
<td>.990</td>
</tr>
<tr>
<td>My teacher helps me when I'm having difficulties</td>
<td>.834</td>
<td>.957</td>
</tr>
<tr>
<td>My teacher compliments me when I am doing a ‘nice job’</td>
<td>.687</td>
<td>.888</td>
</tr>
<tr>
<td><strong>Growth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't learn anything at this school (recoded)</td>
<td>.453</td>
<td>.899</td>
</tr>
<tr>
<td>What I'm learning here is good for my future</td>
<td>.798</td>
<td>.956</td>
</tr>
<tr>
<td>I'm learning from the things I have to do at school</td>
<td>.886</td>
<td>.982</td>
</tr>
<tr>
<td>I'm learning the right things at school</td>
<td>.762</td>
<td>.999</td>
</tr>
<tr>
<td><strong>Structured classroom atmosphere</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can work well on my schoolwork in the classroom</td>
<td>.783</td>
<td>.859</td>
</tr>
<tr>
<td>I'm very well able to pay attention in the classroom</td>
<td>.816</td>
<td>.779</td>
</tr>
<tr>
<td>When our teacher explains something, we are quiet</td>
<td>.520</td>
<td>.992</td>
</tr>
<tr>
<td><strong>Positive student affiliation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like my classmates</td>
<td>.832</td>
<td>.968</td>
</tr>
<tr>
<td>My classmates are nice to me</td>
<td>.808</td>
<td>.994</td>
</tr>
<tr>
<td>My classmates are entertaining</td>
<td>.771</td>
<td>.947</td>
</tr>
<tr>
<td><strong>Negative student interactions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classmates are beating and kicking in the classroom</td>
<td>.541</td>
<td>.722</td>
</tr>
<tr>
<td>Classmates are bullying each other in the classroom</td>
<td>.717</td>
<td>.792</td>
</tr>
<tr>
<td>Classmates are arguing with each other in the classroom</td>
<td>.736</td>
<td>.906</td>
</tr>
<tr>
<td>We call each other names in the classroom</td>
<td>.691</td>
<td>.968</td>
</tr>
<tr>
<td>My classmates make lot of noise in the classroom</td>
<td>.463</td>
<td>.961</td>
</tr>
</tbody>
</table>
Table 3 | Reliability, Descriptive statistics, ICCs, and Correlations for SECCI Scales (Validation Sample)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Reliability</th>
<th>Descriptives</th>
<th>Correlations between level-1 factors and between level-2 factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α level-1</td>
<td>α level-2</td>
<td>n</td>
</tr>
<tr>
<td>Teacher support (1)</td>
<td>.874</td>
<td>.980</td>
<td>1593</td>
</tr>
<tr>
<td>Growth (2)</td>
<td>.802</td>
<td>.973</td>
<td>1588</td>
</tr>
<tr>
<td>Structured classroom atmosphere (3)</td>
<td>.765</td>
<td>.927</td>
<td>1588</td>
</tr>
<tr>
<td>Positive student affiliation (4)</td>
<td>.844</td>
<td>.966</td>
<td>1591</td>
</tr>
<tr>
<td>Negative student interactions (5)</td>
<td>.757</td>
<td>.957</td>
<td>1592</td>
</tr>
</tbody>
</table>

** *p < .01.
# Table 4 | Fit Measures of Multiple Group CFA Models (Validation Sample)

<table>
<thead>
<tr>
<th>Tests for Measurement Invariance for Gender</th>
<th>χ² (df)</th>
<th>CFI</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>AC</th>
<th>DIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: configural invariance</td>
<td>870.980 (320)</td>
<td>.957</td>
<td>.949 (.049, .050)</td>
<td>.046</td>
<td>.96</td>
<td>84.730.27</td>
<td>84.419.75</td>
</tr>
<tr>
<td>Model 2: metric invariance</td>
<td>897.982 (340)</td>
<td>.957</td>
<td>.952 (.045, .049)</td>
<td>.045</td>
<td>.96</td>
<td>84.734.63</td>
<td>84.417.96</td>
</tr>
<tr>
<td>Model 3: intercept-only invariance</td>
<td>925.554 (340)</td>
<td>.955</td>
<td>.949 (.043, .050)</td>
<td>.046</td>
<td>.96</td>
<td>84.911.13</td>
<td>84.663.97</td>
</tr>
<tr>
<td>Model 4: scalar invariance</td>
<td>954.008 (360)</td>
<td>.954</td>
<td>.951 (.042, .049)</td>
<td>.045</td>
<td>.96</td>
<td>84.914.38</td>
<td>84.667.79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tests for Measurement Invariance for Age Group (&lt;13 years, &gt;13 years)</th>
<th>χ² (df)</th>
<th>CFI</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>AC</th>
<th>DIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: configural invariance</td>
<td>953.346 (320)</td>
<td>.954</td>
<td>.946 (.047, .054)</td>
<td>.046</td>
<td>.96</td>
<td>82.975.17</td>
<td>83.635.21</td>
</tr>
<tr>
<td>Model 2: metric invariance</td>
<td>994.981 (340)</td>
<td>.953</td>
<td>.947 (.046, .053)</td>
<td>.049</td>
<td>.96</td>
<td>82.907.90</td>
<td>83.551.19</td>
</tr>
<tr>
<td>Model 3: intercept-only invariance</td>
<td>1,114.721 (340)</td>
<td>.944</td>
<td>.937 (.050, .057)</td>
<td>.054</td>
<td>.96</td>
<td>83.054.04</td>
<td>83.666.33</td>
</tr>
<tr>
<td>Model 4: scalar invariance</td>
<td>1,152.757 (360)</td>
<td>.943</td>
<td>.939 (.050, .056)</td>
<td>.053</td>
<td>.96</td>
<td>83.056.76</td>
<td>83.668.56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tests for Measurement Invariance for Facility</th>
<th>χ² (df)</th>
<th>CFI</th>
<th>RMSEA (90% CI)</th>
<th>SRMR</th>
<th>AC</th>
<th>DIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: configural invariance</td>
<td>868.163 (320)</td>
<td>.957</td>
<td>.949 (.043, .050)</td>
<td>.045</td>
<td>.96</td>
<td>83.911.33</td>
<td>84.663.67</td>
</tr>
<tr>
<td>Model 2: metric invariance</td>
<td>938.491 (340)</td>
<td>.953</td>
<td>.948 (.047, .051)</td>
<td>.047</td>
<td>.96</td>
<td>83.965.44</td>
<td>84.610.47</td>
</tr>
<tr>
<td>Model 3: intercept-only invariance</td>
<td>1,065.683 (340)</td>
<td>.943</td>
<td>.937 (.048, .055)</td>
<td>.052</td>
<td>.96</td>
<td>83.911.13</td>
<td>84.663.97</td>
</tr>
<tr>
<td>Model 4: scalar invariance</td>
<td>1,141.996 (360)</td>
<td>.939</td>
<td>.936 (.049, .056)</td>
<td>.052</td>
<td>.96</td>
<td>83.914.38</td>
<td>84.667.79</td>
</tr>
</tbody>
</table>

*Note.* All chi-square values are statistically significant at p < .001.

| Model 1: configural invariance                      | 1.141.996 (360) | .954 | .949 (.043, .050) | .046 | .96 | 84.192.75 | 84.505.96 |
| Model 2: metric invariance                          | 1.152.757 (360) | .953 | .949 (.042, .050) | .045 | .96 | 84.192.75 | 84.505.96 |
| Model 3: intercept-only invariance                  | 1.194.721 (340) | .953 | .947 (.045, .051) | .049 | .96 | 84.417.96 | 84.663.97 |
| Model 4: scalar invariance                          | 1.194.721 (360) | .944 | .946 (.045, .050) | .047 | .96 | 84.417.96 | 84.663.97 |

Chi-square, df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; AC = Akaike Information Criterion; BIC = Bayesian information criterion; lowest AIC and BIC values are printed in bold.

---

[Note: The table contains fit measures for multiple group CFA models, testing for measurement invariance across gender, age group, and facility. The models are evaluated using chi-square tests, CFI, RMSEA, SRMR, AIC, and BIC. All chi-square values are statistically significant at p < .001. The table includes models for configural, metric, intercept-only, and scalar invariance.]
Measurement invariance
Several multiple group CFA models were examined to test for measurement invariance of the SECCI across groups, using the validation sample (see Table 4 for fit indices of all specified models).

First, we conducted several CFAs for groups based on gender (boys versus girls). In the first step, two separate CFAs were conducted for boys ($\chi^2_{160} = 561; p < .001, \text{CFI} = .960; \text{TLI} = .953; \text{RMSEA} = .045 [90\% \text{CI} = .041, .049], \text{SRMR} = .041$), and girls ($\chi^2_{160} = 306; p < .001, \text{CFI} = .950; \text{TLI} = .940; \text{RMSEA} = .051 [90\% \text{CI} = .042, .060], \text{SRMR} = .055$), indicating a good model fit for both groups. Also, a model without constraints across groups displayed a good fit (Model 1: configural invariance). Model 2, representing metric invariance, demonstrated a good fit. The change in $\chi^2$ as well as change in CFI ($<0.01$) suggested that there was no significant deterioration in model fit compared to Model 1. Model 3, representing intercept-only invariance, and Model 4 (scalar invariance), demonstrated no significant deterioration in model fit across models. Based on the majority of fit indices, Model 4 was accepted. Because scalar invariance allows meaningful comparison of latent factor means, we tested differences in mean factor scores between groups. Compared to boys, girls showed a significantly lower mean factor score on the factor Structured classroom environment ($\Delta M = -.217; p = .001$).

Second, we conducted several CFAs for groups based on age (13> versus <13 years). Two separate CFAs were conducted for students below 13 years ($\chi^2_{160} = 247; p < .001, \text{CFI} = .923; \text{TLI} = .909; \text{RMSEA} = .059 [90\% \text{CI} = .044, .073], \text{SRMR} = .066$), and students aged 13 years and older ($\chi^2_{160} = 658; p < .001, \text{CFI} = .958; \text{TLI} = .950; \text{RMSEA} = .047 [90\% \text{CI} = .043, .051], \text{SRMR} = .044$), indicating an acceptable model fit for both groups. Also, a model without constraints across groups displayed a good fit (Model 1). Model 2, representing metric invariance, demonstrated a good fit. The change in $\chi^2$ as well as change in CFI ($<0.01$) suggested that there was no significant deterioration in the model fit compared to Model 1.

Model 3, representing intercept-only invariance demonstrated no significant deterioration in model fit compared to the metric invariance model. Model 4 (scalar invariance) did demonstrate a significant deterioration in model fit compared to the metric invariance model ($\Delta \text{CFI} = .01$).

Third, we conducted several CFAs for groups based on type of facility (open schools versus schools in secure care facilities). In the first step, two separate CFAs were conducted for open schools ($\chi^2_{160} = 491; p < .001, \text{CFI} = .961; \text{TLI} = .954; \text{RMSEA} = .043 [90\% \text{CI} = .039, .048], \text{SRMR} = .048$), and secure care ($\chi^2_{160} = 377; p < .001, \text{CFI} = .951; \text{TLI} = .941; \text{RMSEA} = .053 [90\% \text{CI} = .046, .060], \text{SRMR} = .053$), indicating a good model fit for both groups. Also, a model without constraints across groups displayed a good fit (Model 1). Model 2, representing metric invariance, demonstrated a good fit.
The change in $\chi^2$ as well as change in CFI (<0.01) suggested that there was no significant deterioration in the model fit compared to Model 1. However, the model representing intercept-only invariance did not hold, which means that intercepts between groups were significantly different, meaning that the latent constructs are not measured identically in each group.

**DISCUSSION**

The present study examined the factor structure and reliability of the SECCI-R in a sample of children, adolescents and young adults in 26 schools for special education in The Netherlands. The hypothesized five-factor structure was first examined in a construction sample and replicated in the validation sample. MCFA was used to examine the factor structure of the SECCI-R at the within- and between-group level (i.e., classroom level). Results supported factorial validity and reliability of the SECCI-R, consisting of the factors Teacher support, Positive student affiliation, Negative student interactions, Structured classroom environment, and Growth. Measurement invariance analyses demonstrated scalar invariance for gender, and metric invariance for age and type of facility.

The SECCI-R can be used for practice-oriented research in schools for special education. Teachers and school psychologists could use results of the assessment as input for a dialogue with students about their experiences of classroom climate. Routinely monitoring classroom climate enables teachers and school psychologists to provide appropriate guidance. For example, if school psychologists establish that students experience negative student interactions, they may provide teachers with advice how to stop these interactions and create a more positive classroom climate. Notably, there is empirical evidence showing that a positive classroom climate can contribute to positive social and academic development of students in regular education (La Paro & Pianta, 2003; Maras, Demetre, Moon, & Tolmie, 2012; Wissink et al., 2014).

A first limitation of this study is that classroom climate was not assessed by means of teacher report or observer report measures in order to establish convergent validity. Future validation studies of the SECCI-R should examine associations with intrinsic and extrinsic learning motivation as well as internalizing (anxiety and depression) and externalizing (aggression and norm transgressive behavior) problems to examine criterion validity. Also, test-retest reliability could not be established because the present study was cross-sectional. Another limitation of the study is that the school level (level-3) was not taken into account. Although the SECCI-R is a measure of classroom climate, levels of classroom climate may vary across schools. Future studies should address this point by including the school level as a third level in the analysis. Two
of the five scales (Structured classroom environment and Positive student affiliation) consist of three items only, because items had to be removed after statistical analyses. Although these scales proved to be reliable in terms of internal consistency, construct underrepresentation might be an issue. For instance, social connectedness in terms of friendships among students seems underrepresented in the scale for Positive student affiliation, while class characteristics that may harm structure (e.g., disruptive student behavior) seem underrepresented in the scale for Structured classroom environment (see Marras et al., 2012; Wissink et al., 2014). Further research on the SECCI-R is needed to devise items that assess aspects of Positive student affiliation and Structured classroom climate that seem now underrepresented in these scales.

The present study found preliminary evidence for the factor structure and reliability of the SECCI-R in a group of students with emotional and behavioral problems attending special education classes. The next step would be to make the necessary amendments to the SECCI-R and replicate our study findings, additionally examining convergent as well as criterion validity and test-retest reliability. We assume that repeated measurement of classroom climate by means of the SECCI-R, discussing the outcomes with teachers and students by school psychologists, can contribute to the improvement of classroom climate.
REFERENCES


5

The Impact of Classroom Climate on Students’ Perception of Social Exclusion in Secondary Special Education

ABSTRACT

The present study examines the relation between classroom climate in schools for secondary special education and students perceived social exclusion. A total of 401 Dutch adolescents (70.3% males) with conduct problems, attending schools for special education, filled out questionnaires on classroom climate, problems in social information processing, externalizing behavior and perceived social exclusion. Results showed that a positive classroom climate was associated with a reduction of students’ externalizing behavior problems and perceived social exclusion, which was associated with improvements in social information processing. However, these relations were only found at the within group level of analysis (between students) and not at the between group level (between classes); thus contextual (class level) effects could not be demonstrated. It can be carefully stated that a positive classroom climate in secondary special education may protect against perceived social exclusion. Future research is required to examine whether our findings can be replicated in other schools for secondary special education or can be generalized to secondary education in general.
INTRODUCTION

Social exclusion is a situation in which an individual or group is denied access to social rights, opportunities or resources that are normally available to others (Hoff & Vrooman, 2011; Williams, Forgas, & Von Hippel, 2005). It may be considered as one of the most harmful threats to positive youth development during adolescence (Hutchison, Abrams, & Christian, 2007). Although in The Netherlands and other Western countries many community and societal risk and protective factors for social exclusion have been established, and it is well-known that in particular underprivileged groups may be at increased risk for social exclusion, little is known about the ways adolescents become socially excluded in the context of the school, and which school factors can prevent students’ social exclusion (Jehoel-Gijsbers & Vrooman, 2007; Sparkes, 1999). One such factor may be classroom climate, which refers to the quality of the students’ social learning environment in terms of teacher support, relationships among students, structure, and growth possibilities (Beld et al., 2017). In schools with a positive classroom climate the relationships among students, teachers, and other school staff are positive, there is a sense of collaboration and participation, while collective norms and goals are pursued (Payne, Gottfredson, & Gottfredson, 2003).

Risk factors for social exclusion may be overrepresented in special education classes for conduct disordered adolescents. These adolescents need additional attention and guidance, because they often struggle with a physical and/or mental disorder, emotional- and behavioral problems, and psychiatric issues, such as ADHD, ODD, CD, and disorders related to autism (Stoutjesdijk & Scholte, 2009). Often these adolescents have social information processing difficulties, which have been found to be connected to externalizing problems (DeLisi et al., 2009; Van der Helm et al., 2013; Young, Justice, & Erdberg, 2004).

Adequate social information processing is necessary for unbiased perception and integration of social information and facilitates self-regulation in order to solve problems as well as successful goal setting and achievement (Dodge, 1993). Adolescents who inadequately process social information have a distorted image of reality. For example, instead of focusing on neutral information, the adolescent’s attention might become focused on threatening information and hostile signals, becoming more inclined to respond with aggression in (negative) contact with peers (Dodge et al., 2003).

We assume that classroom climate in schools for secondary special education can affect students’ perceptions of social exclusion through its effect on externalizing behavior (i.e., aggression and norm trespassing behavior) and inadequate social information processing. First, research shows that a positive classroom climate is associated with less externalizing behavior, whereas a negative classroom climate is
related to more externalizing behavior (Barth et al., 2004; Steffgen et al., 2013). Students showing externalizing behaviors may be perceived as difficult by their peers and become ‘unwanted’, which evokes interpersonal rejection and, subsequently, social exclusion (Killen et al., 2013; see also: Stenseng, Belsky, Skalicka, & Wichstrøm, 2014).

Second, a positive classroom climate is assumed to affect students’ social information processing in a positive way, because students develop a positive working model of social relationships and better self-regulatory skills through positive interactions with peers and teachers (Ryan & Deci, 2017; Sameroff, 2009; Sutherland, Lewis-Palmer, Stichter, & Morgan, 2008; Van der Ploeg, 2010). In contrast, a negative classroom climate may lead to a negative working model of social relationships and lack of self-regulatory skills, resulting in biased social information processing (Ryan & Deci, 2000; Sameroff, 2009; Sutherland et al., 2008; Van der Ploeg, 2010). Students with inadequate social information processing might isolate themselves through lack of the necessary social skills to build and maintain rewarding social relationships with others. Notably, distorted social information processing may even increase perceptions of social exclusion and interpersonal rejection where no social exclusion actually occurs (Dodge, McClaskey, & Feldman, 1985; Matthys, Cuperus, Maassen, & Van Engeland, 2001).

The present study examined the relation between classroom climate, problems in social information processing, externalizing behavior, and students perceived social exclusion in secondary special education. Structural equation modeling (SEM) was used to test a path model with multiple mediators, in which problems in social information processing and externalizing behavior were hypothesized to mediate the relation between classroom climate and perceived social exclusion. We hypothesize a positive classroom climate to be associated with lower perceived social exclusion (H1) and less externalizing behavior (H2). We also expect problems in social information processing (SIP) to mediate the relation between classroom climate and social exclusion (H3) and classroom climate and externalizing behavior (H4).

**METHOD**

**Sample**
The present study took place in schools for secondary special education in Amsterdam, The Netherlands, where a culturally diverse group of students with emotional and behavioral disorders (EBD) and learning disabilities receive education. All students were asked to participate in the study. In total, 401 of the 488 students (83% response rate) took part in the study, representing 56 classes with an average cluster size of 7 (range = 1-16 students per class, 1 singleton). A number of students were not present because
of illness or other reasons for non-attendance. A total of four students did not want to sign an informed consent form, and six students did not receive permission from their parents to participate in the study. The average age of the students was $M = 15.31$ years old ($Min = 12$ years, $Max = 22$ years, $SD = 1.95$). The sample consisted of 70.3% boys and 28.2% girls. A total of 67.6% of the students had a non-western ethinical background.

**Procedure**

Data were obtained in March 2015 in five schools for special education in Amsterdam. Parents of the students were informed about the study beforehand through a letter. Besides information about the goal of the study, parents were given the possibility to (dis)agree with their child(ren)’s participation in the study at the administration office in the school, depending on age. The questionnaires were filled out by the students, which were completed in around 40 minutes. In some classes the questionnaires were read out loud by the researchers because students’ reading abilities were not sufficient. An informed-consent form was attached to the questionnaires. Students declared that they were willing to participate, after having received information about the goal and proceedings of the study, including anonymous use of the data for scientific purposes. The informed-consent form was archived separately from the questionnaires, and a code was added to the questionnaires indicating to which class the student did belong. Students were asked to fill out the questionnaires individually.

**Materials**

*Classroom climate* was measured with the Special Education Classroom Climate Inventory-Revised (SECCI-R; Beld et al., 2019). The SECCI-R is a student self-report questionnaire and assesses various aspects of classroom climate with 21 items, rated on a 5-point Likert type scale (1 = ‘strongly disagree’ to 5 = ‘strongly agree’), and five scales. Beld et al. found a good fit of a multilevel factor model, supporting construct validity of the classroom climate measure at both the within- and between-group (classroom) level: $\chi^2 (314) = 802.63, p < .001$; $CFI = .967$, $TLI = .960$, $RMSEA = .031$, $SRMRW = .035$, $SRMRB = .080$. Internal consistency of the factors was good for all factors with Cronbach’s alpha’s above .75.

The first scale, ‘Positive student affiliation,’ measures to what extent students experience friendly and amiable behavior in their class. In the present study, this scale had an internal consistency of $\alpha = .82$. An example item is “I think my classmates are nice”. The second scale, ‘Negative peer interactions,’ measures to what extent students experience disruptive and disorderly behavior in class ($\alpha = .83$). An example item is “We call each other names in class”. The third scale, ‘Teacher support,’ measures to what extent students experience support and stimulation from their teachers ($\alpha = .88$). An
example item is “The teachers help with problems”. The fourth scale, ‘Structured classroom environment’, measures to what extent sufficient structure is offered and whether students experience a pleasant atmosphere in class ($\alpha = .66$). An example item is “It’s chaotic in class”. All items of this scale were recoded in that higher scores reflected more structure. The fifth scale, ‘Growth possibilities’, measures to what extent the students think they learn useful things in school for their future ($\alpha = .74$). An example item is “I learn good things here in school”.

Problems in social information processing was measured using the Taxonomy of Problematic Social Situations – Adolescent self-report version (TOPS-A, Van der Helm et al., 2013), a Dutch translation of the TOPS (Dodge et al., 1985; Matthys et al., 2001). This instrument assesses inappropriate responses of adolescents to problematic social situations and distinguishes between four types of social problem situations: Disadvantage, competition, accepting authority, and accepting/giving help. Van der Helm et al. (2013) found evidence for construct validity of the TOPS-A. Using confirmatory factor analysis (CFA), their results showed a good fit to the data: $\chi^2 (186) = 209.41, p < .001; \text{CFI} = .976, \text{TLI} = .970$, and RMSEA = .032. Internal consistency of the factors was satisfactory.

The questionnaire consists of twenty-four items, rated on a 5-point Likert type scale (1 = ‘strongly disagree’ to 5 = ‘strongly agree’). The first scale, ‘Disadvantage’, measures the extent to which an adolescent perceives disadvantage, such as unjust treatment by others, including attribution of hostility (internal consistency is $\alpha = .72$). An example item is “When others tell me I wear the wrong clothes, I yell at them”. The second scale, ‘Competition’, measures how children experience playing together and how they cope with winning and losing ($\alpha = .70$). An example item is “If I win, I call the other a loser”. The third scale, ‘Accepting/giving help’, measures to what extent adolescents ask for help in situations, and to what extent they accept support of peers or offer help to peers ($\alpha = .55$). An example item is “When I feel bad and someone asks me what’s wrong, I keep my mouth shut”. The fourth scale, ‘Accepting authority’, measures to what extent adolescents are able to accept the authority of their teacher ($\alpha = .72$). An example item is “When the teacher leaves the classroom, I do whatever I want”. A higher score on the scales indicates higher levels of problematic social information processing.

Externalizing behavior was measured with the rule braking and aggressive behavior subscales of the Youth Self Report (YSR, Achenbach, 1993; Achenbach & Rescorla, 2001; Verhulst, Van der Ende, & Koot, 1997). The YSR is designed for use with adolescents between 11-18 years and assesses adolescents’ perception of their own emotional and behavioral problems (Verhulst, et al., 1997), showing good validity and reliability in
several studies both in The Netherlands (De Groot, Koot, & Verhulst, 1996) and in other Western countries (Ivanova et al., 2007). The YSR consists of thirty-two items, rated on a 3-point Likert type scale (0 = ‘Not at all’; 1 = ‘A little or sometimes’; 2 = ‘Clearly or often’), representing nine narrow-band scales (e.g., Attention Problems, Thought problems, and Social problems), and three broad-band scales (Internalizing, Externalizing, and Total Problems). In the present study, the Rule breaking behavior and Aggressive behavior scales were used to assess Externalizing behavior. An example item of the Rule breaking scale is “I lie and cheat”, and an example of the Aggressive behavior scale is “I fight a lot”. The YSR has been extensively used in research to assess youth’s emotional and behavioral problems. The broadband scales of the Dutch version of the YSR have been found to be reliable with Cronbach’s alphas between .78 - .91. (Verhulst et al., 1997). In the present study, internal consistency reliabilities for rule breaking behavior (α = .76) and aggressive behavior (α = .86) were good. Social exclusion was measured with seven items, which are considered to constitute the concept of perceived social exclusion as outlined by Hutchison et al. (2007), that is, the perception of being ‘excluded, rejected, or marginalized from desired relationships or groups’ (p. 30). The questions each have three answer possibilities (1 = Disagree, 2 = I don’t know, 3 = Agree). An example item of this scale is “I never get what I’m entitled to”. We examined construct validity of the scale by means of confirmatory factor analysis, using Mplus (Muthén & Muthén, 1997-2012). To account for non-normally distributed ordinal data, the means and variance adjusted weighted least squares estimation procedure (WLSMV) was chosen. Results showed a good fit to the data: $\chi^2 (14) = 29.65, p = .009; \text{CFI} = .977, \text{TLI} = .966$, and $\text{RMSEA} = .054$ (90% CI = .026, .081). Standardized factor loadings ranged from .58 to .79. The scale was found to be internally consistent (α = .70), with corrected item-total correlations ranging from .33 to .51.

**Analysis**

In preliminary analyses we examined the associations between group climate, externalizing behavior problems, problems in social information processing, and social exclusion by means of bivariate correlation analyses (Pearson’s $r$). Pearson’s correlations of $r = .10 - .30$ are seen as small, $r = .30 - .50$ are considered as a moderate, and $r > .50$ are seen as a large (Cohen, 1988). Subsequently, we tested the study hypotheses through multilevel structural equation modeling (MSEM), using Mplus software version 6.11 (Muthén & Muthén, 1997-2010).

We followed the procedures outlined by Hox (2010). First, intraclass correlation coefficients (ICCs) were calculated to examine the between-group (i.e., between classes) variability and the degree of non-independence in the data (Raudenbush & Bryk, 2002). ICCs greater than zero are indicative of nested data structures, in which case multilevel
analysis is necessary in order to account for dependency of observations (Byrne, 2012). Then, the covariance matrix was decomposed into a pooled within- and between-level covariance matrix. The within-level covariance matrix was used to examine the within-level part of the model, and the between-level covariance matrix was used to examine the between-level part of the model. Next, a multilevel structural equation model was fitted to the data in which the within- and between-level models were estimated simultaneously, using the ‘type = twolevel’ option in Mplus. Maximum likelihood (ML) was used to estimate all models.

We hypothesized a direct effect of classroom climate on social exclusion, and two mediation effects in that the relation between classroom climate and social exclusion would be mediated by externalizing behavior and problems in social information processing. We also hypothesized multiple mediation, with paths from classroom climate to social information processing, from social information processing to externalizing behavior, and from externalizing behavior to social exclusion. The hypothesized model is depicted in Figure 1.

First, a measurement model was examined using the within-level covariance matrix. In this model, classroom climate was a latent variable, with five indicators: positive student affiliation, negative student interactions, teacher support, structured classroom environment and growth possibilities. Externalizing behavior was a latent variable, with rule breaking behavior and aggressive behavior as indicators. Problems in social information processing was a latent variable, with the following indicators: disadvantage, competition, accepting/giving help, and accepting authority. Social exclusion was used as a composite variable (mean score) in the model. Second, a structural model was examined using the within-level covariance matrix, in which paths between latent variables were specified as well as paths from the latent variables to the observed (composite) variable social exclusion. Third, the between-level covariance matrix was used to examine the measurement model and structural model at the between-level part of the model. In the final step, a two-level model was specified, in which the within- and between-level models were estimated simultaneously. Before conducting the two-level model, the variable negative student interactions was recoded such that higher scores indicated less problematic interactions, because research on MSEM has found that reverse scored variables may cause convergence problems in multilevel SEM (Gustafson & Stahl, 2005). In MSEM, negative residual variance at level-2 is a common problem, which can result in nonconvergence of the model (Kim, Dedrick, Cao, & Ferron, 2016). Because the residual variance of the structured classroom environment variable at level-2 was close to zero and non-significant, this residual variance was fixed to zero, which is a recommended practice when using multilevel SEM (Hox, 2010).
Exact model fit was calculated with a Chi-squared test. Because the Chi-squared test is sensitive to sample size, fit measures that are less sensitive to sample size were also used (Cheung & Rensvold, 2002): The Tucker-Lewis Index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The SRMR at the within-group level (SRMRW) and between-group-level (SRMRB) were examined to examine model fit of the two-level model. A non-significant Chi-square value is considered to indicate an exact fit to the data, while the following fit values indicate a close fit to the data: TLI > .95; CFI > .90; RMSEA ≤ .08; SRMR ≤ .08 (Cheung & Rensvold, 2002). Modification indices, giving the
expected drop in chi-square if the parameter in question is freely estimated, were used to improve model fit.

RESULTS

Preliminary analyses
There was a very small proportion of missing values, ranging from 0 to 1.5% per variable. Little’s MCAR test ($\chi^2 (65) = 79.32, p = .109$) was non-significant, indicating that missing values were missing completely at random. Missing values were imputed by means of expectation maximization. Table 1 shows the means, standard deviations, and ICCs of the five indicators of classroom climate, the two indicators of externalizing behavior, the four indicators of problems I, social information processing and perception of social exclusion as well as the correlations among these variables.

In general, small to moderate correlations were found. Aspects of classroom climate were negatively and significantly correlated with perceived social exclusion (range \( r = -.20 \text{ – } -.21 \)), except for negative peer interactions (\( r = .28 \)). Notably, no significant correlations were found between positive student affiliation and accepting authority and rules, between teacher support and coping with competition and accepting/giving help, and between growth possibilities and coping with competition and accepting/giving help. Further, externalizing behavior (rule breaking and aggressive behavior) was significantly and positively associated with problems in social information processing (range \( r = .22 \text{ – } .56 \)) and perceived social exclusion (\( r = .38 \)), showing small to moderate correlations. Also, problems in social information processing was positively associated with perceived social exclusion (range \( r = .18 \text{ – } .36 \)). The results indicate that a more positive classroom climate was associated with lower levels of social exclusion, whereas more externalizing behavior problems and inadequate social information processing were associated with higher levels of social exclusion.

Structural equation modeling
First, a measurement model was examined using the within-level covariance matrix in which classroom climate, problems in social information processing, and externalizing behavior was specified as latent variables. The model showed a mediocre fit to the data: \( \chi^2 (41) = 186.84, p < .001, \text{ CFI} = .885, \text{ TLI} = .845, \text{ RMSEA} = .094, \text{ SRMR} = .073 \). Model fit was improved by allowing correlations between residual variances of the factors growth and teacher support and between structured classroom environment and negative student interactions. This modification of the model resulted in acceptable fit: \( \chi^2 (39) = 106.38, p < .001, \text{ CFI} = .947, \text{ TLI} = .925, \text{ RMSEA} = .066, \text{ SRMR} = .052 \).
<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
<th>ICCs</th>
<th>1</th>
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<th>3</th>
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<th>11</th>
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</thead>
<tbody>
<tr>
<td>1. Positive student affiliation</td>
<td>4.01</td>
<td>0.90</td>
<td>.10</td>
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<tr>
<td>2. Negative peer interactions</td>
<td>3.70</td>
<td>1.03</td>
<td>.16</td>
<td>-0.22**</td>
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<tr>
<td>3. Teacher support</td>
<td>3.94</td>
<td>1.00</td>
<td>.25</td>
<td>.35**</td>
<td>-0.16**</td>
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<tr>
<td>4. Structured classroom environment</td>
<td>3.03</td>
<td>0.95</td>
<td>.10</td>
<td>-0.26**</td>
<td>-0.48**</td>
<td>0.28**</td>
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<tr>
<td>5. Growth possibilities</td>
<td>3.87</td>
<td>1.00</td>
<td>.18</td>
<td>-0.29**</td>
<td>-0.13**</td>
<td>0.59**</td>
<td>0.20**</td>
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<tr>
<td>6. Rule breaking behavior</td>
<td>0.32</td>
<td>0.27</td>
<td>.05</td>
<td>-0.17**</td>
<td>0.27**</td>
<td>-0.23**</td>
<td>-0.22**</td>
<td>-0.23**</td>
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<tr>
<td>7. Aggressive behavior</td>
<td>0.37</td>
<td>0.33</td>
<td>.04</td>
<td>-0.13**</td>
<td>0.33**</td>
<td>-0.22**</td>
<td>-0.29**</td>
<td>-0.16**</td>
<td>0.73**</td>
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<tr>
<td>8. Perceived disadvantage</td>
<td>2.26</td>
<td>0.81</td>
<td>.05</td>
<td>-0.13*</td>
<td>0.37**</td>
<td>-0.19**</td>
<td>-0.25**</td>
<td>-0.20**</td>
<td>0.47**</td>
<td>0.56**</td>
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<tr>
<td>9. Coping with competition</td>
<td>1.78</td>
<td>0.81</td>
<td>.05</td>
<td>-0.11*</td>
<td>0.23**</td>
<td>0.02</td>
<td>-0.16**</td>
<td>-0.02</td>
<td>0.31**</td>
<td>0.39**</td>
<td>0.49**</td>
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<tr>
<td>10 Accepting/giving help</td>
<td>2.67</td>
<td>1.05</td>
<td>.08</td>
<td>-0.12*</td>
<td>0.11*</td>
<td>-0.06</td>
<td>-0.17**</td>
<td>-0.09</td>
<td>0.22**</td>
<td>0.19**</td>
<td>0.25**</td>
<td>0.33**</td>
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<tr>
<td>11 Accepting authority and rules</td>
<td>2.03</td>
<td>0.84</td>
<td>.07</td>
<td>-0.08</td>
<td>0.22**</td>
<td>-0.20**</td>
<td>-0.22**</td>
<td>0.16**</td>
<td>0.49**</td>
<td>0.53**</td>
<td>0.54**</td>
<td>0.47**</td>
<td>0.28**</td>
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</tr>
<tr>
<td>12 Social exclusion</td>
<td>1.48</td>
<td>0.46</td>
<td>.05</td>
<td>-0.20**</td>
<td>0.28**</td>
<td>-0.20**</td>
<td>-0.21**</td>
<td>-0.20**</td>
<td>0.37**</td>
<td>0.38**</td>
<td>0.36**</td>
<td>0.26**</td>
<td>0.18**</td>
<td>0.25**</td>
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</table>

Note. N = 401, ** p < .01, * p < .05 (two-tailed).
Second, the structural model was specified, which showed a good fit to the data: \( \chi^2 (47) = 121.24, p < .001, \) CFI = .945, TLI = .923, RMSEA = .063, SRMR = .051. Next, the between-level covariance matrix was used to replicate the measurement model. Model fit was unacceptable: \( \chi^2 (41) = 1,009.39, p < .001, \) CFI = .191, TLI = .086, RMSEA = .649, SRMR = .192. Further examination of the between-covariance matrix indicated that a model with externalizing behavior and problems in social information processing represented by latent variables could not be fitted at the between-level. Therefore, a model with only one latent variable classroom climate was specified, which showed a good fit to the data: \( \chi^2 (4) = 5.70, p = .223, \) CFI = .993, TLI = .982, RMSEA = .087, SRMR = .061. The structural model at the between-level in which the relation between classroom climate and social exclusion was examined resulted in a worse fitting model: \( \chi^2 (8) = 32.01, p < \)
.001, CFI = .908, TLI = .827, RMSEA = .231, SRMR = .114. Subsequently, a two-level model (Figure 2) was fitted, in which the within- and between-level models were examined simultaneously. In this model, problems in information processing and externalizing behavior were declared as within-level variables and not modeled at the between-level. This model showed a good fit to the data: $\chi^2 (52) = 93.54, p < .001, \text{CFI} = .970, \text{TLI} = .953, \text{RMSEA} = .045, \text{SRMRW} = .043, \text{SRMRB} = .055$.

At the within-level part of the model, classroom climate was negatively related to externalizing behavior ($\beta = -.252, p < .001$), problems in social information processing ($\beta = -.501, p < .001$), and perceived social exclusion ($\beta = -.300, p < .001$). This means that a positive classroom climate was predictive of less externalizing behavior, less problems in social information processing, and less perceived social exclusion. Externalizing behavior was positively related to social exclusion ($\beta = .209, p = .021$). Social information processing was not significantly associated with social exclusion. At the between-level part of the model, classroom climate was not significantly associated with social exclusion. The relation between classroom climate and social exclusion proved to be significantly mediated by externalizing behavior (indirect effect, $\beta = -.053, p = .042$). The relation between problems in social information processing and social exclusion was also significantly mediated by externalizing behavior (indirect effect, $\beta = .125, p = .027$). Multiple mediation was tested, in which both social information processing problems and externalizing behavior mediated the relation between classroom climate and social exclusion. Results were significant (indirect effect, $\beta = -.063, p = .028$).

**DISCUSSION**

The current study examined whether classroom climate in secondary schools for special education was related to the perception of social exclusion in adolescents with emotional and behavioral problems. A positive classroom climate proved to be associated with a reduction of both perceived exclusion (H1 confirmed) and externalizing behavior problems (H2 confirmed). We found evidence for multiple mediation, which indicated that the relation between classroom climate and externalizing behavior was partly mediated by problems in social information processing (H3 partly confirmed), while the relation between problems in social information processing and social exclusion was fully mediated by externalizing behavior problems (H4 confirmed). However, these relations were only found at the within-level of analysis (between students), and no relations between classroom climate, externalizing behavior, and social exclusion were found at the between-level (between classes). We therefore conclude that students’ individual perception of a positive classroom climate was negatively associated with
self-reported externalizing behavior, problems in social information processing, and social exclusion, while contextual (class level) effects could not be demonstrated.

Unexpectedly, problems in social information processing were not directly associated with social exclusion. A plausible explanation would be that externalizing behavior put students at risk for actual (real) social exclusion by their classmates and teachers, whereas social exclusion is not affected by biased social information processing, which in our study proved to be a strong predictor of externalizing behavior problems. In other words, social exclusion may turn out to be a real-life phenomenon related to externalizing behavior of students attending special education rather than a subjective experience.

The relation between classroom climate was not fully mediated by social information processing and externalizing behavior problems, which indicates that more factors may explain the relation between classroom climate and social exclusion. For instance, students can also exclude themselves from social situations due to internalizing behavior problems (Birmaher et al., 2004; Chorpita & Southam-Gerow, 2006). Further research should focus on both externalizing and internalizing antecedents of social exclusion, since two profiles of social exclusion were distinguished on the basis of internalizing and externalizing behavior by Killen and colleagues (2013), accounting for problems in social information processing that are associated with both internalizing and externalizing behavioral tendencies (see Hoogsteder, Wissink, Stams, Van Horn, & Hendriks, 2014).

Externalizing behavior could be a a be a cause of social exclusion (Dodge et al., 2003; Killen et al., 2013), especially if externalizing behavior is expressed as an angry reaction to insults or frustration (Card & Little, 2006); yet it can also be the result of social exclusion (MacDonald & Leary, 2005; Twenge et al., 2001). In both directions, there is empirical evidence showing that hostile cognitive biases (i.e., problems in social information processing) may underlie the association between externalizing behavior and social exclusion (De Wall, Twenge, Gitter, & Baumeister, 2009). Janssens and colleagues (2017) described bidirectional effects: experiencing peer rejection reinforces aggressive and rule-breaking behavior, while adolescents who display aggressive and rule-breaking behaviors are more likely to be rejected by peers. Further longitudinal research might test this bidirectional model explaining social exclusion.

Secondary schools are often faced with complex social issues, such as intergroup social exclusion (Mathieson et al., 2008), which often results in discrimination among students (Van den Bos et al., 2009; Van der Valk & Wagenaar, 2010). Since students in secondary special education are youngsters who become more and more influenced by their peers and are less influenced by parental supervision (De Jong, 2015; Sentse, 2010), school may have an important role in the prevention of these problems. It can be
carefully stated that a positive classroom climate in secondary special education may at least contribute to lowering the risk for social exclusion of their students.

The current study has some limitations. A first limitation is that social exclusion was measured as a one-dimensional construct instead of a multi-dimensional construct (Hoff & Vrooman, 2011), which prohibits a more fine-grained analysis of the relation between classroom climate and the perception of social exclusion. Future studies on the relation between classroom climate in special education schools should assess the multiple dimensions of social exclusion, including limited social participation, lack of normative integration, inadequate access to basic social rights, and material deprivation (Hoff & Vrooman, 2011). A second limitation is that results were based on student self-report questionnaires only. Teacher-report and observations could be a valuable addition to student self-report. A third limitation is that data gathering has been completed in a Dutch metropolitan environment, where youth who attend special education are raised in disadvantaged neighborhoods, which limits the generalizability of our findings. Finally, the design of the study was cross-sectional instead of longitudinal, which sets limits to the causal interpretation of our results.

The current study showed that there are clear indications for an association between perceived classroom climate and social exclusion, which is explained by the effect of classroom climate on students' biased social information processing and, subsequently, their externalizing behavior problems. Further research should focus on both internalizing and externalizing antecedents of social exclusion as a risk factor for lack of school commitment and social connectedness in general. In addition, experimental research is needed to examine whether improvement of classroom climate can affect social exclusion in a causal way. Finally, research on social exclusion should be extended from special education schools in disadvantaged neighborhoods to special education schools in non-risk urban and rural areas and to schools for regular (secondary) education in order to test the generalizability of our findings. If our results can be generalized, it might become possible to prevent social exclusion in both risk and non-risk contexts by improving classroom climate. We tend to believe that Nelson Mandela was right when he stated, “education is the most powerful weapon which you can use to change the world”.
REFERENCES


The Impact of Classroom Climate on Students’ Perception of Social Exclusion


Chapter 5


6

General Discussion
High quality special education for students with emotional and behavioral problems (Cluster IV) is very important for their socio-emotional and academic development, and successful participation in society. However, quality assurance, the process to monitor and improve the quality of special education, has been difficult to achieve (Rijksoverheid, 2019b, especially within (semi-)residential youth care institutions (Harder, et al., 2014; Rijksoverheid, 2019b). In order to improve the quality of education for students with emotional and behavioral problems or special educational needs, from August 2014 schools are required to offer ‘appropriate education’ to students who need extra support (Article 18A, paragraph 2 of the Appropriate Education Act). This measure has been taken because appropriate education can reduce the chance of socio-emotional, behavioral and academic problems of students who need extra support both in schools for regular and special education (Feinstein, 2004; Lotz & Lee, 1999; Rijksoverheid, 2019a).

In order to offer high quality appropriate education, it is important to know how the classroom climate could meet the needs of students with emotional and behavioral problems in special education. The instruments used to measure classroom climate in regular education are probably not suitable for special education, because students in schools for special education have different characteristics (e.g., limited attention span) and show different behaviors than students in regular education. The first aim of this dissertation was therefore to develop and validate two instruments for measuring classroom climate in schools for special education and residential special education in The Netherlands. The second aim was to examine the relation between classroom climate and academic self-concept of students with emotional and behavioral problems in residential schools for special education, accounting for individual characteristics (identification with school and general self-worth) and contextual characteristics (living group climate). The third aim was to examine the relation between classroom climate and perceived social exclusion of students with emotional and behavioral problems attending special education.

**MAIN FINDINGS**

The first study examined the validity and reliability of the student self-report Special Education Classroom Climate Inventory (SECCI) in a sample of 325 students (age $M = 16.10$, $SD = 2.00$, 63.0% male students) attending special education classes in six (semi) secure residential settings and two youth prisons. Confirmatory Factor Analysis (CFA) of a four-factor model – with ‘Teacher support’, ‘Positive student affiliation’, ‘Negative peer interactions’, and ‘Unstructured classroom environment’ as dimensions – showed an adequate fit to the data, indicating construct validity of the SECCI. Limited evidence
for concurrent validity was found in associations between classroom climate and academic self-concept. Cronbach’s alpha reliability coefficients were good. Although further development of the SECCI and replication of our study results seem necessary, the SECCI can be used to assess classroom climate in schools for special education for students in secure institutional and correctional youth care.

The second study used the SECCI and other adolescent self-report questionnaires to examine associations between living group climate, classroom climate, identification with school, general self-worth and academic self-concept of students attending schools for special education in residential youth care institutions. The sample consisted of 184 students (age $M = 16.40$, $SD = 1.99$, 63.6% male students) with severe emotional and behavioral problems. Results showed a weak association between living group climate and classroom climate, and somewhat stronger associations between classroom climate, identification with school and general self-worth on the one hand and academic self-concept on the other hand. It was concluded that group workers and teachers should collaborate for the benefit of integrated care and education in residential youth care facilities.

The third study describes the development, factor structure, and reliability of the revised Special Education Classroom Climate Inventory (SECCI-R) in a construction sample of N = 401 students ($M$ age = 15.27, $SD = 2.52$, 71.4% male), and a validation sample of 1,596 students ($M$ age = 14.55, $SD = 2.42$, 78.2% male) representing 255 classes from 26 schools for special education in The Netherlands. Multilevel CFA was used to examine the factor structure of the SECCI-R. A model with five correlating factors at the within- and between-group level showed a satisfactory fit to the data. Reliabilities of the scales were good. The findings provided preliminary support for the factor structure and reliability of the SECCI-R in adolescents with emotional and behavioral problems attending special education classes. There is still a need for further development of the SECCI-R, while future replication studies should examine the factor structure of the SECCI-R, internal consistency and test-retest reliabilities of all scales, and finally convergent as well as criterion validity.

The fourth and final study of this dissertation examined the relation between classroom climate in schools for secondary special education and students perceived social exclusion. A total of 401 Dutch adolescents (age $M = 15.31$, $SD = 1.95$, 70.3% males) with conduct problems, attending schools for special education, filled out questionnaires on classroom climate, problems in social information processing, externalizing behavior and perceived social exclusion. Results showed that a positive classroom climate was associated with a reduction of students’ externalizing behavior problems and perceived social exclusion, which was associated with improvements in social information processing. However, these relations were only found at the
within group level of analysis (between students) and not at the between group level (between classes), thus contextual (class level) effects could not be demonstrated. It can be carefully stated that a positive classroom climate in schools for secondary special education may protect against perceived social exclusion. Future research is required to examine whether our findings can be replicated in other schools for secondary special education or can be generalized to secondary education in general.

Through these 4 studies insights was gained into characteristics of classroom climate in special education, and more specifically into the valid and reliable measurement of classroom climate in special education, and the relation between classroom climate in special education and the perception of students’ academic competence and social relationships with fellow students. These results provide tools for improving the quality of special education for students with emotional and behavioral problems, so that these students have a better perspective, for example, because they can take maximum advantage of the education offered to them, obtain a diploma, and thus enter the workforce and through that way find their way in society.

**Recommendations for practice**

1) To monitor the quality of classroom climate in (residential) schools for special education, which has become possible with the newly developed instruments (SECCI & SECCI-R).

2) To improve the quality of classroom climate in special education by the use of interventions, because a positive classroom climate may positively affect students’ academic self-concept and prevent social exclusion of students with emotional and behavioral problems attending (residential) schools for special education.

3) To promote the collaboration between youth care professionals and teachers in (residential) schools for special education.
IMPLICATIONS OF THE FINDINGS

This dissertation has several implications. Starting at the macro level it is important to take recent developments in secondary education and youth care in the Netherlands into consideration. Since 2009, the Dutch ministry of Ministry of Health, Welfare and Sports (VWS) and the Ministry of Security and Justice (VJ), both concerned with youth care, and the Dutch ministry of Ministry of Education, Culture and Science (OCW), concerned with formal education, together have become responsible for special education in residential youth care institutions. The combined responsibilities of these ministries should result in collaboration between youth care professionals and teachers and the development of integrated preventive and curative care and adequate treatment for students with emotional and behavioral problems and special needs.

It is assumed that students attending special education and receiving (residential) care and treatment profit from integrated care and education, or at least the attunement between the care and educational system. A first evaluation of the integrated supervision of both ministries showed that the qualitative goals are widely supported, that some improvements have been achieved, but that the sustainable and continuous improvement of quality still needs more time and effort (Rijksoverheid, 2019b). The results of the present dissertation provide input for the improvement of special education in residential youth care institutions.

One of the results from this dissertation, namely the weak association between living group climate and classroom climate, indicates that the living group and the residential classroom are rather distinct child-rearing contexts. This implies that both contexts may exert unique influence on the adolescents, which may affect both their socioemotional and educational development, while adolescents' experiences at the living group may to some extent spill over to the classroom and vice versa. This means that the teacher must be able to understand the behavior of the student from a broad contextual perspective, since classroom climate is (partly) a reflection of what has taken place in the social context of the living group. Therefore, communication between group workers and teachers who are involved with the same student(s) seems important. Notably, there is a need for intensive collaboration between group workers at the living group and teachers at school for the benefit of integrated care and education in residential youth care facilities (See Gomez & Ang, 2007; Van der Grinten et al., 2018).

More in general, the youth care and educational system should work together for screening purposes in order to be able to timely signal psychosocial problems in children and adolescents, to make sure that positive treatment effects can be maintained over time and context, to achieve continuity of care, and for the implementation of evidence-based group based prevention programs for internalizing or externalizing problems (for
an overview, see Cooper & Jacobs, 2011). In at risk populations or (residential) schools for special education of children with emotional and behavioral disorders, education, social work and youth (health) care should work together in a joint effort to improve individualized and/or group-based care (e.g., trauma-sensitive care) for vulnerable children.

Lastly, the findings of this dissertation can possibly be generalized to regular schools with classrooms where students with emotional and behavioral problems are attending education, as students in (residential) schools for special education may show some commonalities with students with emotional and behavioral disorders in regular education (Rijksoverheid, 2019). For all schools that serve students with behavioral problems and where negative interactions among students occur and student-teacher relationships quality may be negatively affected by characteristics of individual students and classes, this dissertation offers insights in processes at the classroom level that may affect both academic self-concept and social exclusion. First, results showed positive associations between classroom climate, identification with school and general self-worth on the one hand and academic self-concept on the other hand. Second, a positive classroom climate was associated with a reduction of students’ externalizing behavior problems and perceived social exclusion, which was associated with improvements in social information processing. It is therefore concluded that improvement of classroom climate may be one of the avenues through which care and education for students with emotional and behavioral problems may be advanced.

It seems important to implement intervention programs, such as Key2Teach, Non Violence Resistance or Positive Classroom Behavior Support, which can improve classroom climate in schools for both regular and (residential) special education and evaluate the effectiveness of these programs by means of experimental-longitudinal research (Hoogendijk, Holland, Tick, & Hofman, 2019; Kilicarslan, 2019; Simonsen et al., 2019). Notably, two instruments to assess classroom climate have been developed and validated in this dissertation to be used in (experimental and longitudinal) research. Future studies should also examine whether teachers hold certain attitudes or cognitions that influence the classroom climate that students experience. This is important because personal beliefs about child-rearing and education have been shown to affect their professional behavior (Frymier & Nadler, 2017). Finally, it is important to investigate whether and how parents should be involved in (residential) schools for special education.
METHODOLOGICAL STRENGTHS AND LIMITATION

Several general limitations of this dissertation should be considered. First, all studies of this dissertation were cross-sectional and were based on student self-report only. Questionnaire report of teachers and group workers from the residential youth care facility as well as observations could be a valuable addition to student self-report in future studies. However, the students’ perspective on classroom climate was thoroughly studied, acknowledging the active role of students in building relationships with their classmates and teachers. Another limitation is that only quantitative methods were used in the four studies. The use of qualitative methods could be a valuable addition in order to take full account of the perspective of the students attending special education and cross-validate the quantitative results. Despite these limitations, the present dissertation does make an important contribution to the field of classroom climate in both residential and non-residential schools for special education. The development of the SECCI and SECCI-R will help schools for special education to monitor quality of classroom climate.

CONCLUDING REMARKS

Appropriate education in the Netherlands functions under considerable pressure, which warrants further research-based efforts to continuously improve appropriate education (Rijksoverheid, 2020). Special education is increasingly considered as an option of last resort for students with emotional and behavioral problems from the perspective of social inclusion, and risks for both social exclusion and stigmatization when students attend special education classes. However, for a small group of the most vulnerable and sometimes traumatized students, experiencing severe internalizing problems (anxiety and depression) and/or externalizing problems (aggression and delinquency), special education may (sometimes) be the only way to let them attend education and successfully work on their psychological and educational needs. Results of this dissertation may be used to improve the quality of special education, with the prospect of successful participation in society of students attending special education.
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APPENDIX

Summary
Summary in Dutch
Acknowledgements (Dankwoord)
Curriculum Vitae
Author’s List of Publications
SUMMARY

High quality special education for students with emotional and behavioral problems is very important for their socio-emotional and academic development and successful participation in society. In order offer high quality appropriate education, it is important to know how the classroom climate could meet the needs of students with emotional and behavioral problems in special education. Because students in schools for special education have different characteristics and show different behaviors than students in regular education, the instruments used to measure classroom climate in regular education are probably not suitable for special education. In this dissertation two developed instruments for measuring classroom climate in schools for special education and residential special education in The Netherlands are described. Even as the relation between classroom climate and academic self-concept of students with emotional and behavioral problems in residential schools for special education, (accounting for individual characteristics (identification with school and general self-worth) and contextual characteristics (living group climate) of students) and the relation between classroom climate and perceived social exclusion of students with emotional and behavioral problems attending special education.

The first study examined the validity and reliability of the student self-report Special Education Classroom Climate Inventory (SECCI) in a sample of 325 students (age $M = 16.10$, $SD = 2.00$, 63.0% male students) attending special education classes in six (semi) secure residential settings and two youth prisons. Confirmatory Factor Analysis (CFA) of a four-factor model – with ‘Teacher support’, ‘Positive student affiliation’, ‘Negative peer interactions’, and ‘Unstructured classroom environment’ as dimensions – showed an adequate fit to the data, indicating construct validity of the SECCI. Limited evidence for concurrent validity was found in associations between classroom climate and academic self-concept. Cronbach’s alpha reliability coefficients were good. Although further development of the SECCI and replication of our study results seem necessary, the SECCI can be used to assess classroom climate in schools for special education for students in secure institutional and correctional youth care.

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concept on the other hand. It was concluded that group workers and teachers should collaborate for the benefit of integrated care and education in residential youth care facilities.

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Insight was gained into characteristics of classroom climate in special education, and more specifically into the valid and reliable measurement of classroom climate in special education, into the relation between classroom climate in special education and the perception of students’ academic competence and social relationships with fellow students. These results provide tools for improving the quality of special education for students with emotional and behavioral problems, so that these students get a better future perspective, for example, because they can take maximum advantage of the
education offered to them, obtain a diploma, and thus enter the work force and through that way find their way in society.

**Recommendations for practice**

4) To monitor the quality of classroom climate in (residential) schools for special education, which has become possible with the newly developed instruments (SECCI & SECCI-R).

5) To improve the quality of classroom climate in special education by the use of interventions, because a positive classroom climate may positively affect students’ academic self-concept and prevent social exclusion of students with emotional and behavioral problems attending (residential) schools for special education.

6) To promote the collaboration between youth care professionals and teachers in (residential) schools for special education.
Kwalitatief hoogwaardig speciaal onderwijs voor leerlingen met emotionele en gedragsproblemen is erg belangrijk voor hun sociaal-emotionele en academische ontwikkeling en succesvolle deelname aan de samenleving. Om adaptief onderwijs van hoge kwaliteit te bieden, is het belangrijk om te weten hoe het klasklimaat kan voldoen aan de behoeften van leerlingen met emotionele en gedragsproblemen in het speciaal onderwijs. Omdat de kenmerken van leerlingen in scholen voor speciaal onderwijs verschillen van de kenmerken van leerlingen in het regulier onderwijs en zij andere gedragingen vertonen, zijn de instrumenten die worden gebruikt om klasklimaat te meten in het reguliere onderwijs waarschijnlijk niet geschikt voor speciaal onderwijs. In dit proefschrift worden twee nieuwe instrumenten voor het meten van het klasklimaat op scholen voor speciaal onderwijs en residentieel speciaal onderwijs in Nederland gevalideerd. Ook wordt de relatie tussen klasklimaat en academisch zelfconcept van leerlingen met emotionele en gedragsproblemen in residentiële scholen voor speciaal onderwijs onderzocht (rekening houdend met individuele kenmerken (identificatie met school en algemene zelfwaardering) en contextuele kenmerken (leefklimaat) van leerlingen) en de relatie tussen klasklimaat en waargenomen sociale uitsluiting van leerlingen met emotionele en gedragsproblemen bij het speciaal onderwijs.

De eerste studie onderzocht de validiteit en betrouwbaarheid van de zelfrapportagevragenlijst voor leerlingen: de Special Education Classroom Climate Inventory (SECCI) in een steekproef van 325 leerlingen (leeftijd $M = 16,10$, $SD = 2,00$, 63,0% mannelijke leerlingen) die onderwijs volgen in scholen, behorende bij zes residentiele instellingen voor open, gesloten en forensisch jeugdzorg. Een Confirmatieve Factor Analyse (CFA) van een vierfactorenmodel - met 'ondersteuning voor docenten', 'positieve leerlingrelaties', 'negatieve interacties tussen leerlingen' en 'ongestructureerde klasomgeving' als dimensies - bleek goed bij de data te passen, hetgeen de geldigheid van de SECCI bevestigt. Beperkt bewijs voor concurrente validiteit werd gevonden in samenhangen tussen klasklimaat en academisch zelfconcept. Cronbach's alpha betrouwbaarheidscœfficiënten waren goed. Hoewel verdere ontwikkeling van de SECCI en replicatie van onze studieresultaten noodzakelijk lijken, kan de SECCI worden gebruikt om het klasklimaat te beoordelen in scholen voor speciaal onderwijs voor leerlingen in de residentiële jeugdzorg.

De tweede studie gebruikte de SECCI en andere adolescentie zelfrapportagevragenlijsten om samenhangen te onderzoeken tussen het leefklimaat, het klasklimaat, de identificatie met school, het algemene zelfbeeld en het academische zelfconcept van leerlingen die onderwijs volgen in scholen voor speciaal onderwijs, behorende bij residentiële jeugdzorginstellingen. De steekproef bestond uit 184 leerlingen (leeftijd
De derde studie beschrijft de ontwikkeling, factorstructuur en betrouwbaarheid van de herziene Special Education Classroom Climate Inventory (SECCI-R) in een constructiesteekproef van 401 leerlingen (leeftijd $M = 15,27$, $SD = 2,52$, 71,4% jongens), en een validatiesteekproef van 1.596 leerlingen (leeftijd $M = 14,55$, $SD = 2.42$, 78,2% jongens), bestaande uit 255 klassen van 26 scholen voor speciaal onderwijs in Nederland. Multilevel CFA werd gebruikt om de factorstructuur van de SECCI-R te onderzoeken. Een model met vijf correlerende factoren bleek goed bij de data te passen. De betrouwbaarheid van de schalen was goed. De resultaten bieden voorlopige ondersteuning voor de factorstructuur en betrouwbaarheid van de SECCI-R bij leerlingen uit het (voortgezet) speciaal onderwijs met emotionele en gedragsproblemen. Er is nog steeds behoefte aan verdere ontwikkeling van de SECCI-R, aangezien in toekomstige replicatiestudies de factorstructuur van de SECCI-R, interne consistentie en test-hertestbetrouwbaarheid van alle schalen en uiteindelijk convergente evenals criteriumvaliditeit moeten worden onderzocht.

De vierde en laatste studie van dit proefschrift onderzocht de relatie tussen het klasklimaat in scholen voor voortgezet speciaal onderwijs en de door leerlingen ervaren sociale uitsluiting. In totaal vulden 401 Nederlandse adolescente leerlingen van scholen voor speciaal onderwijs (leeftijd $M = 15,31$, $SD = 1,95$, 70,3% mannen) met gedragsproblemen, de vragenlijsten over het klasklimaat, problemen bij de verwerking van sociale informatie, externaliserend gedrag en waargenomen sociale uitsluiting in. De resultaten lieten zien dat een positief klasklimaat samenhangt met een vermindering van externaliserende gedragsproblemen van leerlingen en waargenomen sociale uitsluiting, wat gepaard ging met verbeteringen in de verwerking van sociale informatie. Deze relaties werden echter alleen gevonden op het binnen klassen niveau (verschillen tussen leerlingen binnen een klas) en niet op het tussen klassen niveau (verschillen tussen klassen), dus konden geen contextuele (klassenniveau) effecten worden aangetoond. Er kan gesteld worden dat een positief klasklimaat in scholen voor voortgezet speciaal onderwijs een protectieve werking kan hebben voor waargenomen sociale uitsluiting. Vervolgonderzoek is nodig om te onderzoeken of onze bevindingen kunnen worden gerepliceerd in andere scholen voor voortgezet speciaal onderwijs of kunnen worden gegenereerd naar het regulier voortgezet onderwijs.
Inzicht werd verkregen in de kenmerken van het klasklimaat in het speciaal onderwijs, en meer specifiek in de valide en betrouwbare meting van het klasklimaat in het speciaal onderwijs, in de relatie tussen het klasklimaat in het speciaal onderwijs en de perceptie van academische competenties van leerlingen en sociale relaties met medeleerlingen. Deze resultaten vormen een hulpmiddelen voor het verbeteren van de kwaliteit van het speciaal onderwijs voor leerlingen met emotionele en gedragsproblemen, zodat deze leerlingen een beter toekomstperspectief krijgen, bijvoorbeeld doordat ze maximaal kunnen profiteren van het aangeboden onderwijs, een diploma kunnen behalen en dus kunnen gaan werken en zo hun weg vinden in de maatschappij.

**Aanbevelingen voor de praktijk**

7) Het monitoren van de kwaliteit van het klasklimaat in (residentiële) scholen voor speciaal onderwijs, hetgeen mogelijk is geworden met de nieuw ontwikkelde instrumenten (SECCI & SECCI-R).

8) De kwaliteit van het klasklimaat in het speciaal onderwijs verbeteren door het gebruiken van interventies, omdat een positief klasklimaat het academische zelfconcept van leerlingen positief kan beïnvloeden en sociale uitsluiting van leerlingen van (residentiële) scholen voor speciaal onderwijs met emotionele en gedragsproblemen kan voorkomen.

9) De samenwerking bevorderen tussen professionals in de jeugdzorg en leerkrachten in (residentiële) scholen voor speciaal onderwijs.
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CURRICULUM VITAE

Marjorie Hanneke Maria Beld was born on November 20th, 1982 in Hengelo, The Netherlands. After completing her secondary education (HAVO) at Twickel College in 2000, she studied at Teacher Training College at Edith Stein University of Applied Science in Hengelo. During graduation in 2004, she started working as a teacher in a school for special education in a forensic youth care institution and continued professional education at Fontys University of Applied Science in Hengelo and the University of Amsterdam, where she studied Forensic Child and Youth Care Sciences. She obtained her master’s degree in Education in 2010. Between 2007 and 2010, she had a job as group worker in a Forensic youth care institution for disabled children, youth and young adolescents and from January 2010 until February 2012 Marjorie worked as a behavioral therapist in secure youth care. In addition, she started in 2012 as a teacher and researcher at Windesheim University of Applied Science in Zwolle. This job includes teaching (future) social work professionals and managing as well as conducting scientific research in order to advise the Board of Directors and Management of youth and forensic care institutions to optimize the quality youth care services and special education. Additionally, Marjorie studied to become a cognitive behavioral therapist, and to become an individual and team coach at Forta Education, Windesheim University of Applied Science in Zwolle, and at Coach Boulevard University of Applied Science in Utrecht. Finally, she worked as an individual and executive coach for management and team coach in several youth and forensic youth care institutions and schools. In 2014 she started her PhD-project at the University of Amsterdam: Research Institute of Child Development and Education, supported by a scholarship from the Dutch Organization of Scientific Research for teachers in schools for higher education in The Netherlands.
AUTHOR’S LIST OF PUBLICATIONS


Still Learning

The impact of classroom climate on students attending secondary special education

Marjorie Beld