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Alternative education

Examining the effects of alternative educational approaches on student achievement, academic motivation and engagement in Flemish primary schools

Proefschrift aangeboden tot het verkrijgen van de graad van
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ALTERNATIVE EDUCATION

Examining the effects of alternative educational approaches on student achievement, academic motivation and engagement in Flemish primary schools

Doctoral dissertation submitted to obtain the degree of Doctor in Educational Sciences, 2012
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In this dissertation the effects of Flemish alternative primary schools (e.g. Freinet schools, Steiner/Waldorf schools) and alternative educational practices (e.g. experiential education) on students' achievement, academic motivation and engagement were examined. Students from both alternative and traditional schools were followed longitudinally (data were collected from kindergarten to grade 7). Students' development in achievement, academic motivation and engagement was modelled using multilevel growth curve models. To take into account differences between schools in student intake characteristics, we controlled for gender, SES, initial achievement, etc. Besides the examination of main effects of alternative education, we focused on differential effects in terms of students' SES, initial language and initial mathematics achievement.

This dissertation provided evidence that alternative schools succeed to a lesser extent in improving students' *mathematics achievement.* While students from alternative and traditional schools have similar levels of mathematics achievement at the beginning of first grade, students in alternative schools show a lower learning gain compared to their peers in traditional schools. This effect was the largest among the initially high-achieving students. Regarding *reading fluency, spelling and reading comprehension* no evidence was found for differences in learning gain in alternative versus traditional schools.

The effects on *academic engagement* measured both in terms of teacher reports and student self-reports are less clear. Overall the effects are in disfavour of students in alternative schools but they appeared only at the beginning of measurements, were relatively small, or only found among a specific subpopulation of the students. Further, students in alternative schools reported lower levels of both *autonomous and controlled motivation* for school.

These results provide average results for alternative schools, but should be nuanced. First, other studies (e.g. de Bilde et al., 2012) have evidenced differences between alternative schools in terms of pedagogical approach and educational network, as well as differences within these groups. Further, a study on experiential education in kindergarten evidenced that some alternative approaches can be disadvantageous for achievement, especially for initially low-achieving students (e.g., autonomy-supportive teaching style) but that other practices can effectively promote achievement (stimulating teaching style).

METHODEONDERWIJS

Een studie over de effecten van alternatieve onderwijsmethoden op de prestaties, academische motivatie en betrokkenheid van leerlingen in Vlaamse basisscholen

Doctoraatsproefschrift aangeboden tot het halen van een doctoraat in de Pedagogische Wetenschappen, 2012

Kandidaat: Jerissa de Bilde

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In dit doctoraatsproefschrift worden de effecten van Vlaamse methodescholen (bv. Freinetscholen, Steinerscholen) en ervaringsgericht werken op de prestaties, academische motivatie en betrokkenheid van studenten onderzocht. Studenten uit het traditioneel en methodeonderwijs werden longitudinaal gevolgd (data werd verzameld vanaf de derde kleuterklas t.e.m. het eerste jaar secundair onderwijs). De ontwikkeling op gebied van prestaties, academische motivatie en betrokkenheid werd gemodelleerd door multiniveau groeicurvemodellen. Om de verschillen tussen scholen in leerlingpopulatie in rekening te brengen hebben we gecontroleerd voor geslacht, leeftijd, sociaal-economische status (SES), beginprestaties, etc. Naast de studie van hoofdeffecten van methodeonderwijs, hebben we gefocust op differentiële effecten op gebied van SES, initiële taalprestaties en initiële wiskundeprestaties.

In dit doctoraatsproject wordt evidentie gevonden dat methodescholen er minder in slagen de *wiskundeprestaties* van leerlingen te verbeteren. Terwijl er aan het begin van het eerste leerjaar geen verschillen werden gevonden tussen leerlingen van traditionele scholen en leerlingen van methodescholen, leren leerlingen in methodescholen minder snel bij in vergelijking met leerlingen uit het traditioneel onderwijs. Dit effect was het grootst voor leerlingen die in het eerste jaar reeds hoge wiskundeprestaties behaalden. Met betrekking tot *technisch lezen, spelling en begrijpend lezen* werd geen evidentie gevonden voor een verschil in leerwinst tussen leerlingen uit methodescholen en leerlingen uit traditionele scholen.

De effecten op *academische betrokkenheid* gemeten via leerkrachtrapportage en zelfrapportage van studenten waren minder duidelijk. In het algemeen wijzen de resultaten op een nadeel voor leerlingen in methodescholen, maar deze effecten werden enkel gevonden aan het begin van de metingen, waren relatief klein, of werden enkel gevonden bij een subpopulatie van de studenten. Leerlingen in methodescholen rapporteerden verder significant lagere niveaus van *autonome en gecontroleerde motivatie* om zich in te spannen voor school.

Deze resultaten geven een algemeen beeld weer van methodeonderwijs, maar moeten genuanceerd worden. Ten eerste heeft voorgaand onderzoek (de Bilde et al., 2012) aangetoond dat er verschillen gevonden worden tussen methodescholen op basis van hun pedagogische aanpak en onderwijsnet, alsook verschillen binnen deze groepen. Ten tweede heeft een studie over ervaringsgericht werken in de kleuterklas aangetoond dat sommige werkwijzen (autonomie-ondersteunende leerkrachtstijl) nadelig kunnen zijn voor de prestaties), maar vooral van initieel zwakpresterende kleuters, maar dat sommige methoden effectief de prestaties van kleuters kunnen verbeteren (stimulerende leerkrachtstijl).

Dankwoord

In de eerste plaats wil ik graag iedereen bedanken die mee heeft deelgenomen aan het SiBO onderzoek. Alle scholen, directies, leerkrachten, zorgcoördinatoren, leerlingen en ouders wil ik van harte bedanken voor hun participatie. In het bijzonder wil ik ook de methodescholen bedanken. Het gaat immers niet zomaar om deelname aan onderzoek, het gaat om de bereidheid om pen-en-papier toetsen af te nemen die ver kunnen afstaan van de reële onderwijsomgeving. Het gaat om een bereidheid om deel uit te maken van onderwijseffectiviteitsonderzoek en om de eigen resultaten te evalueren. Deze houding reflecteert, naar mijn bescheiden mening, de start van kwaliteitsvol onderwijs. Heel specifiek wil ik de leerkrachten van Steinerscholen bedanken die zes jaar lang (!) meegewerkt hebben met het SiBO onderzoek.

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Veel doctorandi beschrijven hun doctoraat als een proces van bloed, zweet en tranen, waarbij ze in hun dankwoord verwijzen naar de moeilijke strijd die ze geleverd hebben. Ik heb van de eerste tot de laatste dag genoten van mijn doctoraat, en ik wil hier graag heel wat mensen voor bedanken. Jan en Bieke, bedankt om me een kans te geven om mijn doctoraat te starten en af te werken in alle vrijheid en flexibiliteit. Bedankt om met een kritische blik te kijken naar mijn doctoraat en me te stimuleren om het beter te doen. Bedankt voor de kansen die ik gekregen heb om bij te leren en op congres te gaan. Ik wil verder mijn superfijne collega's bedanken voor de collegialiteit, de fijne middagpauzes en heel wat meer (Sara, Tinneke, Carl, Maarten, Ine, Mieke, Machteld, Gudrun, Kim, Barbara, en nog vele anderen). Ook andere vriendinnen die van dichtbij mijn doctoraat hebben opgevolgd wil ik graag bedanken (Janne, Noortje, Eva). De leuke babbels op de trein heb ik te danken gehad aan Viki, Eva, Katrijn en Jo, wat het pendelen toch al iets aangenamer maakt.

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Introduction

In Flanders, parents are free to choose the school to which they will enrol their children. Often, this choice is based on the schools' pedagogical project, perceived discipline and the perceived level of achievement in the school (Nouwen & Vandenbroucke, 2012). Some parents choose to enrol their child in a school with an alternative pedagogical approach, an alternative school (Bomotti, 1996). Examples of such Flemish alternative schools are Freinet schools, Steiner/Waldorf schools, Jenaplan schools, etc (for an overview see Carnie, 2003; Sliwka, 2008). Alternative education is education in which teachers use specific pedagogical or didactical methods, which are different from traditional or mainstream education. In general, alternative education is more child-centred compared to traditional schools, which focus on the curriculum and which are more knowledge or teacher centred. These alternative approaches are gaining increasing popularity in Flanders, not only among parents, but also in the more traditional schools (Jagers, 2009). A variety of alternative practices, like experiential education, have been implemented in traditional schools as well.

The proponents of alternative education generally argue that alternative education is the education of the future. It prepares students not only for today's labour market, but for an optimal functioning as a citizen in a democratic and changing society (Acker, 2007; Annoot, 2010; Van Herpen, 2005). A total and harmonious personality development is one of the core goals of alternative schools. Proponents argue that alternative education promotes students' whole development: not only cognitive skills and knowledge, but also social development, personality development, self-regulation, well-being, creativity, and deep-level learning (Annoot, 2010; Ashley, 2008; Lillard, 2006; Reuter, 2007).

The opponents of alternative education argue that alternative education is detrimental for student outcomes and the integration in the labour market (e.g., Van den Broeck, 2007). For example, students from secondary Waldorf schools encounter difficulties to succeed at university (De Clerq & Verboven, 2010) and finding a job (VDAB Studiedienst, 2009). Another argument that opponents use is that alternative education is especially detrimental for the disadvantaged and low-achieving students (Feys, 2002).

Most of these arguments made by proponents and opponents have seldom been the object of research. The focus of the present dissertation is to examine the effects of alternative education on the school functioning of students: students' achievement and academic

engagement. Before going into specifics, we will first sketch the origins of alternative education, the present situation of alternative schools in Flanders, and give an overview of past research on the effects of alternative education.

1. ORIGINS OF ALTERNATIVE EDUCATION

Although alternative education is sometimes referred to as 'new' forms of education (Simons, Van der Linden, & Duffy, 2000), the ideas behind alternative education are not new at all. During the past century alternative education has become increasingly popular in three waves of interest in alternative education (Van Hout-Wolters, Simons, & Volet, 2000).

The beginning of the 20th century was the advent of several progressive education reform movements, and one looked forward to the new century which Ellen Key (1849-1926) called 'The century of the child' (Sliswa, 2008). These educational reformers wanted to emancipate students, especially children from deprived backgrounds. Throughout the world, there were several initiatives that all contributed to the rise of child-centred education (for an overview, see Sliswa, 2008). In 1907, the Italian paediatrician Maria Montessori (1870-1952) created her first elementary schools to educate children with limited mental abilities (Gardner, 1966). The first Waldorf school was founded in 1919 by the Austrian philosopher Rudolf Steiner (1861-1925) to educate children from the workers at the Waldorf factory (Nicol, 2007). Celestin Freinet (1896-1966) founded his rural schools in 1935 for children from factory workers in France (Acker, 2007). Peter Petersen (1884-1952) was another German educator who focused on community learning in his Jenaplan schools. Helen Parkhust (1887-1973), was inspired by Montessori and created her Dalton schools in the United states. Alexander Neill (1883-1973), is the founder of the Summerhill school. Other pedagogues did influenced education, also traditional education, mostly in an indirect way, such as Ovide Decroly (1871-1932) in Flanders and John Dewey (1859-1952; Kroon & Levering, 2008) in the United States.

The sixties and the seventies set the stage for a revival of the ideas behind alternative education (Van Hout-Wolters, Simons, & Volet, 2000). The philosopher Carl Rogers (1969) inspired educators, especially at universities with his book 'Freedom to learn'. In Flanders,

two pedagogues influenced education. Ferre Laevers (Laevers, 1992) inspired and influenced many Flemish nursery and primary schools with the experiential education approach (1992; Laevers & Heylen, 2003). Life schools were established inspired by the ideas of Carl Medaer (1997).

The present wave of interest in alternative education is rather broad. Also teachers, schools, parents, journalists, are focussing more on alternative schools. In other words, the general public is interested in alternative schools and how they differ from traditional schools. Alternative schools are becoming increasingly popular (Jagers, 2009). Further, the present wave of interest is also more embedded in theories and research about learning, such as lifelong learning, self-regulated learning, constructivistic learning (Van Hout-Wolters, Simons, & Volet, 2000).

2. TODAY'S ALTERNATIVE PRIMARY EDUCATION

Since the early reformers started alternative schools, alternative education has changed, as well as the traditional schools. The huge contrast between alternative and traditional schools as it was at the beginning of the twentieth century has evolved and the differences between both types of education have decreased. Both types of education have incorporated elements of each other. For example, if alternative schools in Flanders are subsidized by the Flemish government (there are only few exceptions), they have to conform to government-obliged educational attainment targets. Traditional schools have nowadays incorporated a lot of alternative techniques, such as project work, centre work, etc. This brings us to the question on which aspects alternative education and traditional education actually differ. In the next paragraph, we will describe the main features of alternative education.

2.1. ALTERNATIVE EDUCATION

The term "alternative education" covers a wide range of educational practices; from traditional alternative education, like Montessori, Dalton, Freinet, Jenaplan, or Steiner/Waldorf schools, to the newer innovating types of education, like experiential

education and life schools. Although these schools are in many ways different from each other, they share some common ideas and practices. Below, we describe the four major characteristics that almost all alternative schools share.

The most central aspect in most alternative education is *the child-centred, or student-centred approach*. Alternative education considers the child, and not the curriculum or learning content, as the starting point of education. Alternative education starts from a certain perspective on the development of the child and seeks how education can improve this development (Sliswka, 2008). This child-centred approach is, in our opinion, the most crucial aspect of alternative education, as the other elements can explicitly or implicitly be derived from this child-centred approach. This child-centred approach also means that alternative schools focus more on the total development of students, including their cognitive, social, emotional and physical functioning. Previous Flemish research has underpinned these premises and evidences that teachers in alternative schools consider the basic skills (such as reading, spelling and mathematics) as relatively less important educational goals than do teachers in traditional schools (Verhaeghe & Gadeyne, 2004). In terms of pedagogical approach and didactics, previous research has documented a whole range of differences. Below, we will describe the three most relevant differences in terms of pedagogical approach between alternative and traditional schools.

- *Constructivistic learning in contextualized, real environment*. In alternative schools, teachers consider the learning process as a process of self-development and active construction, in contrast to teachers in traditional schools, who value this child-centred approach less (Verhaeghe & Gadeyne, 2004). For example, teachers in alternative education make less use of pre-existing handbooks and materials (Verhaeghe & Gadeyne, 2004), but create their own handbooks based on specific projects and lessons.
- The importance of student's *autonomy* and *self-directed learning* takes a special place in alternative education. They start from a great belief in the innate curiosity and will to learn of students (Sliswka, 2008). Observation studies (Van Heddegem, Laevers, & Van Damme, 2004) indicated that teachers in alternative schools adopt a more autonomy-supportive teacher style, devote more time to choice-activities (e.g., centre

work), and offer more freedom within these choice activities (e.g., more choice options, less rules).

- *Collaborative learning* is another common method in alternative schools. Alternative schools focus on the social aspects of education. Teachers in alternative schools focus on social interactions and social skills through peer tutoring, working in groups, project work, etc. (Verhaeghe & Gadeyne, 2004).

In describing the main characteristics of alternative education, we did not wish to provide an exhaustive list. Alternative schools do vary on other aspects as well, for example alternative schools differ from traditional schools in terms of parental involvement, context-based learning, heterogeneous class composition, etc. (Verhaeghe & Gadeyne, 2004). As mentioned before, also between alternative schools differences occur, as specific practices might be more important in one type of alternative schools compared to the other (Verhaeghe & Gadeyne, 2004).

2.2. ALTERNATIVE EDUCATION IN THE FLEMISH EDUCATIONAL SYSTEM

In Flanders, from the year in which children become six years old, education is compulsory (EURYDICE, 2010). Most parents send their children to a government-recognized school of their choice, although they also might send their children to a private school (which is not recognized by the government) or home-school their child. All (government-recognized) schools get basically the same support from the government for the teaching staff and the operational costs. Schools are autonomous in terms of their pedagogy, each school board defines its pedagogical project of mission statement independently. However, all schools are obliged to reach the educational attainment goals with the majority of their students (Vlaamse Overheid, 2008). Additionally, all schools must follow a government-approved curriculum, this is a plan which describes how the school plans to reach the attainment targets (and possible other objectives). Most schools follow learning plans written by their educational network (these are the networks who organize education, e.g. GO!, OVSG, VSKO, etc., see Figure 1). Steiner/Waldorf schools received permission (Federatie Steinerscholen Vlaanderen, 2010) to work on slightly different attainment targets, and follow their own curriculum.

In Flanders, there are five different educational networks that organize alternative education: public schools organized by the Flemish government (GO!), subsidized schools funded by local public authorities (OGO), and subsidized 'free' schools organized by a private organization, such as Catholic schools, FOPEM (Federation of Independent Pluralistic and Emancipatory Alternative schools) and the Rudolf Steiner Federation (RSF). Figure 1 depicts the educational networks that organize alternative schools and the respective types of alternative schools they organize. To depict the variety in number of schools (some categories comprises only 1 school), the least common types of alternative schools (<10 schools in Flanders) are depicted in a light grey rectangle, and the most common types of alternative schools are depicted in a darker grey rectangle. Freinet schools are the most popular type of alternative education (>60 schools in 2010), followed by life schools, experience-based schools and Steiner/Waldorf schools which each about 20 schools in Flanders (EURYDICE, 2010). The other types of schools are much less common in the present Flemish educational landscape.

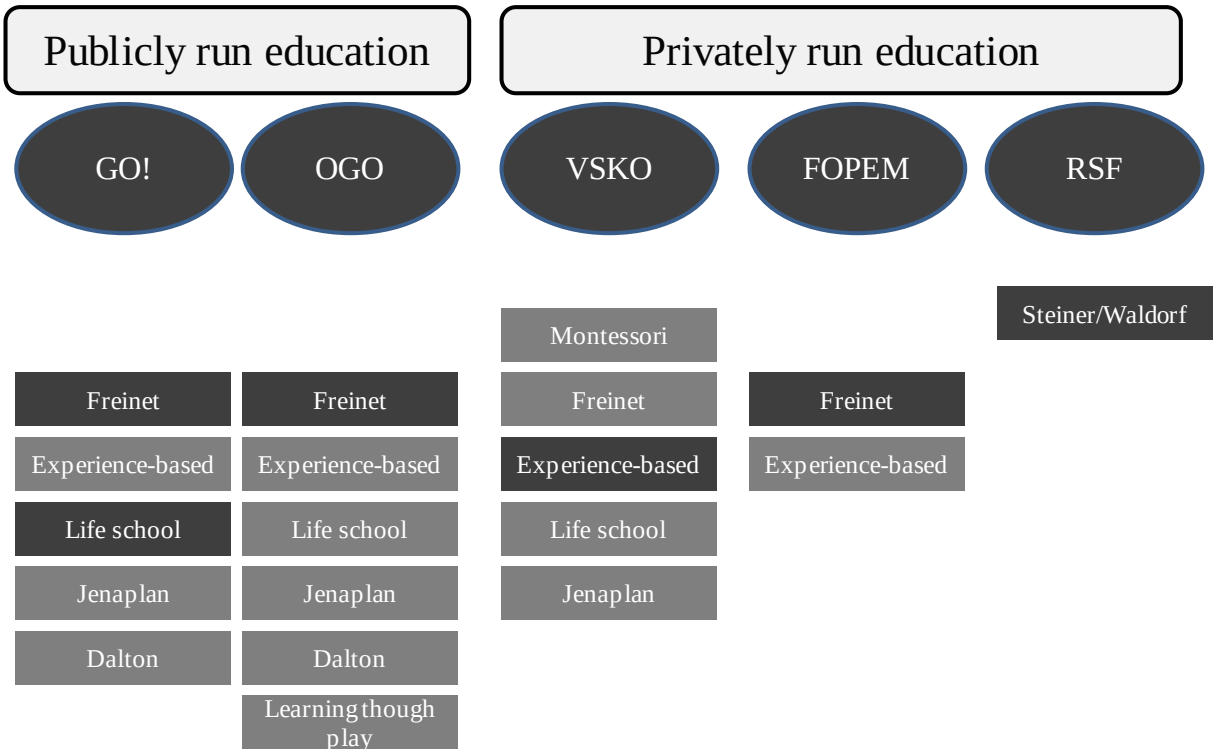

Figure 1. **An overview of alternative schools in the Flemish educational landscape in 2010 (based on statistics from EURYDICE, 2010).**
Note. GO! = Education of the Flemish Community, OGO = Education of the local authorities, VSKO = Flemish Secretariat for Catholic Education, FOPEM= Federation of Independent, Pluralistic and Emancipatory Alternative schools, RSF = Rudolf Steiner Federation.

3. EXAMINING THE EFFECTS OF ALTERNATIVE EDUCATION

The questions about the quality or effectiveness of schools is not a straightforward question to answer. The answer depends on what you find important educational goals, for whom it must be a good school and how the quality of schools is examined. In what follows we will briefly describe three challenges in educational effectiveness research that one should keep in mind when discussing results from educational effectiveness studies.

3.1. THE CHALLENGE TO MAKE A 'FAIR' COMPARISON

3.1.1. CRITERIA FOR EFFECTIVENESS

What are the goals of education? Such a simple question might result in a variety of answers and opinions. Some value basic skills and basic knowledge, such as reading, writing and mathematics, other value lifelong learning skills such as cognitive and metacognitive learning skills, others want schools to be a place in which students become happy, cooperative people with a democratic view on the world, etc. In Flanders, a good starting point for choosing the criteria for school effectiveness are the educational attainment targets. At the end of primary education, educational attainment targets have been imposed to all schools that relate to eight domains: mathematics, Dutch, French, arts, world orientation, learning to learn, ICT and social skills (see AKOV (2010) for an overview).

3.1.2. CAUSAL EFFECTS WITH CORRELATIONAL DATA

As we are often not able to randomly assign students to schools, making causal inferences about school effects is challenging in educational effectiveness research. Schools differ in terms of their school population, and especially in Flanders (EURYDICE, 2010) there is a great variety in school population, as some schools are characterized as 'white' schools while schools with a lot of minority students are often characterized as 'black' schools (Agirdag et al., 2012). If we want to compare the effects of schools, i.e., how much schools can *add* to the learning gain of their students (i.e., added value of schools, see OECD, 2008), we have to

take these differences into account. In an attempt to overcome these difficulties associated with working with correlational data, a combination of two techniques can be used.

The first technique is to map the differences between schools in student population, and try to control for these differences by examining school effects for the average student. Previous studies on differences in student population between alternative and traditional schools (e.g., Verhaeghe & Gadeyne, 2004) have indeed encountered several differences between alternative and traditional schools. For example in preschool, 63% from the students in alternative schools have a mother with a degree in higher education (university or college), compared to 38% of the students in traditional schools. Children in alternative schools also score generally higher on the preparatory reading and arithmetic skills test. No difference was found in percentage of minority students. These results indicate that it is especially important to control for differences in pupil intake characteristics.

The second technique is to follow students longitudinally and to examine the effects of schools on the development of achievement (i.e., learning gain) or general school functioning. Examining school effects on growth gives us a much stronger evidence for school effects, (or what schools add to their students), compared to examining school effects on student status in a certain grade. In general, school effects on the learning gains are generally bigger than school effects on the status in a given grade (Raudenbush & Bryk, 2002). However, there is one problem related to longitudinal data: student mobility. There is some variability between schools in terms of changes in school population. The student group that is enrolled in the first year changes over the school years; some students drop out due to grade retention, school mobility or transfer to special education. Over the years, there are also students who enter the school. In both traditional and alternative schools the student population becomes more and more advanced in terms of average initial language achievement, percentage minority students and average socio-economic status (de Bilde, Verhaeghe, Knipprath, Mertens & Van Damme, 2012). Another problem related to student mobility is missing data on student background characteristics. Students who drop out early, or enter the school at a later point in time, often have missing data on one or more variables. Missing data techniques (Graham, 2009; Widaman, 2006) can to some extend tackle this issue.

3.1.4. DIFFERENTIAL EFFECTS

Most educational effectiveness studies focus on the effects of schools for the 'average' student, in terms of age, SES, initial achievement or other variables (e.g., Sammons, Nuttall & Cuttance, 1993). It is assumed that school effects are similar for other types of students. However, one could argue that some types of students profit to a different extent from different types of schools and different types of instruction. Especially regarding the effectiveness of alternative education, this topic becomes relevant. As we mentioned before, alternative education mainly attracts a privileged population, although originally alternative schools were created for the underprivileged children. Two types of differential effects can occur. The first type of differential effects are effects (i.e., Matthew effects) that result in an increased gap between low-risk and high-risk students (Morgan, Farkas, & Wu, 2011). This effect can result from negative developmental cycles, by which low-risk students profit most from instruction, and high-risk students fall increasingly behind. The second type of differential effect is the compensation effect. Here, at-risk students profit most from education, compared to the low-risk student and begin to catch up (Morgan, Farkas, & Wu, 2011).

3.2. PREVIOUS RESEARCH ON THE IMPACT OF ALTERNATIVE EDUCATION

Research about the effects of specific alternative teaching practices has generally revealed mixed results. Although a full discussion of the literature is beyond the scope of this dissertation, we describe some general tendencies. Some studies found positive consequences (e.g., Dochy, Segers, Van de Bossche, & Gijbels, 2003; Hamilton, McCaffrey, Stecher, Klein, Robyn, & Buliari, 2003; Guthrie, et al., 2004; Nie & Lau, 2010), others found negative consequences (Klahr & Nigam, 2004) or failed to find clear significant consequences of alternative teaching practices (e.g., Hugener et al., 2009). These differences in research can be attributed to differences in student outcomes, operationalization of alternative education, and characteristics of the students. The first is the student outcome under study. As we mentioned before, there is a wide variety of student outcomes that can be examined. Previous research has generally documented the most positive effects of alternative practices on complex skills (Dochy et al., 2003), motivation (Stipek, Feiler, Daniels & Milburn,

1995), reading comprehension (Guthrie et al., 2004), while the effects on knowledge acquisition, basic skills such as mathematics and reading fluency are generally negative (Muijs, Campbell, Kyriakides & Robinson, 2005; Stipek, et al., 1995). A second issue concerns the operationalization of alternative educational practices. Some studies cover only one aspect of alternative education (e.g., collaborative work), others include a variety of alternative practices (e.g., collaborative work, autonomy-support, Guthrie et al., 2004). In general, small put positive effects have been demonstrated of the effects of constructivistic instruction (e.g., Nie & Lau, 2010), autonomy-support (e.g., Reeve, 2006), and collaborative work (e.g., Slavin, 2009). However, a more important issue concern the guided versus unguided nature of the alternative educational practice. It is especially the unguided nature in alternative education that is detrimental for student outcomes. The presence of guidance, structure and clear goals seems to be a crucial element, as unguided alternative practices have generally been proven less effective (Kirschner, Sweller & Clark, 2006) compared to guided alternative education (Mayer, 2004) or compared to direct instruction (Kozioff, LaNunziata, Cowardin, & Besselieu, 2001). Third, most studies on the effects of alternative practices focus on secondary school students or college students. While alternative practices have generally been proven effective in promoting these students' achievement, one cannot simply generalize these studies among younger participants, who generally need less autonomy and more structure and guidance (Eccles, Midgley et al., 1993). Further, studies have indicated that compared to direct instruction, alternative practices are less effective, or even detrimental, for low-SES students or students with initial learning problems (Jeynes & Litlell, 2000; Slavin, Lake, Davis, & Madden, 2011).

In contrast to the large number of studies examining alternative educational practices, the effect of alternative education at the school level has seldom been the object of research. The vast majority of the studies that examined the effects of alternative schools have not been published in peer-reviewed journals and often pertain to only a specific type of alternative school. Not to mention the methodological limitations (e.g., insufficient control for prior student characteristics, small sample size) that characterize many previous studies. In our literature review, we selected only quantitative studies that incorporated at least 30 students and controlled for school differences in pupil intake characteristics (e.g. educational attainment level of the mother).

3.2.1. EFFECTS ON ALTERNATIVE EDUCATION ON ACHIEVEMENT

Previous Flemish research among alternative schools indicated that the preparatory language and mathematic skills of kindergartners in alternative schools are significantly higher than in traditional schools (Verhaeghe & Gadeyne, 2004; Verhaeghe & Van Damme, 2004; Verhaeghe & Van Damme, 2005). In a study in the Netherlands, Paas and Mulder (2010) found small differences between schools in kindergartners' preparatory skills after control for the educational level of the parents. Kindergartners in Dalton schools generally scored higher on preparatory reading and mathematics tests, while kindergartners in Montessori and Jenaplan schools scored lower on these tests.

By the end of first grade, this head start is transformed into a significant backlog (Verhaeghe & Van Damme, 2005). Correction for the effect of students' background characteristics even sharpens this difference. De Bilde et al. (2012) compared five groups (in terms of pedagogy and educational network) to traditional schools. In the first years of primary education the learning gain of students in alternative schools is smaller compared to traditional schools, but by the end of primary education (grade 5 and 6) the learning gain is larger (de Bilde et al., 2012). By the end of primary education, two out of five groups op alternative schools still have lower scores on mathematics achievement, one group has lower scores on spelling, and another group on reading fluency. One group scored higher on reading comprehension. Further, de Bilde et al. (2012) argued that there are not only differences between groups of alternative schools, there can be substantial differences within these groups of alternative schools.

Other scholars also provided mixed results in the examination of the effects of alternative education. Paas and Mulder (2010) evidenced that fifth and eighth grade students in Jenaplan and Montessori schools scored lower on reading and mathematics tests, but students in Dalton schools did not differ from students in traditional schools. Studies including Montessori schools in the United States generally shed a positive image of Montessori education. Lillard and Else-Quest (2006) evidenced positive effects of Montessori education in an experimental design. Studies including only Steiner/Waldorf schools generally found negative effects of the Steiner/Waldorf approach on achievement outcomes. Cunningham and Carroll (2011) matched first-grade children from two Steiner/Waldorf

schools to first-grade children from a traditional school on initial reading ability and home literacy environment. The children in traditional schools, who were on average younger than Steiner/Waldorf-educated children, outperformed their peers in Steiner/Waldorf schools on spelling. No difference was found in reading fluency or reading comprehension. Among ninth-grade secondary students, Steenbergen (2009) found that there was no difference in students' achievement on a Dutch language test after correction for student background characteristics (gender, IQ, SES, and other family characteristics). Further, students from Waldorf schools scored lower on mathematic tests in seventh and ninth grade, but no difference in learning gain was found (Steenbergen, 2009). The study of Steenbergen further focused on differential effects of Steiner/Waldorf schools for different groups of students (in terms of student characteristics such as gender, intelligence, SES, and the children's previous level of functioning), but she found little evidence for differential effects.

3.2.2. EFFECTS OF ALTERNATIVE EDUCATION ON ACADEMIC MOTIVATION AND ENGAGEMENT

Previous research has also reported mixed results about the effects of alternative schools on students' academic motivation and engagement. Paas and Mulder (2010) found no differences between traditional, Dalton and Jenaplan schools in terms of students school engagement such as effort expenditure and learning behaviours. Students in Montessori schools were less engaged in their school, as rated by their teachers. Previous Flemish research (Brutsaert, 1993) indicated that at the end of primary education, children in Steiner/Waldorf schools reported to be less positive about their school, to have a lower general self-concept and were less involved in their studies. A study among seventh and ninth grade secondary students (Steenbergen, 2009) generally found positive effects of Steiner/Waldorf education on motivation and engagement. Between seventh and ninth grade, students in Steiner/Waldorf schools reported increasingly better relationships with their teachers and reported increasing use of self-regulated learning strategies, compared to the development in traditional schools. Further, she found that the decline in academic engagement was smaller in Steiner/Waldorf schools compared to traditional schools. Steenbergen (2009) further focussed on differential effects and she reported that the

differences between high-risk and low-risk students in terms of academic engagement and self-regulated learning strategies are generally larger in Steiner/Waldorf schools.

4. PRESENT DISSERTATION

4.1. RESEARCH OBJECTIVES

The goal of the present doctoral dissertation is to examine the effects of alternative education in Flanders. Three main outcome domains were considered; achievement (mathematics, spelling, reading fluency and reading comprehension), behavioural and emotional aspects of school engagement (school enjoyment, effort expenditure, autonomous participation) and the underlying motivational process (autonomous and controlled motivation). Alternative education was examined in terms of specific pedagogical approach of the school (alternative schools) as well as in terms of experiential education, which could be implemented in traditional schools as well. Because of the limited number of previous studies on the effects of alternative education, which also reported mixed results, no prior hypotheses were formulated.

Following the distinction between main and differential effects in previous studies, we examined both main effects (i.e., effects after controlling for differences in student intake characteristics) and differential effects (i.e., the effects for high-risk versus low-risk students). The variables indicating risk of school failure were SES, initial language achievement and initial mathematics achievement, as these three variables have been extensively used in previous studies to examine differential effects (Sammons, Nuttall, & Cuttance, 1993; Hamre & Pianta, 2005). Figure 2 describes the conceptual framework of this doctoral dissertation, as it depicts both main effects (the horizontal flow from alternative education to student outcomes) and differential effects (the influence of student characteristics on the effects of alternative education, see the vertical effect).

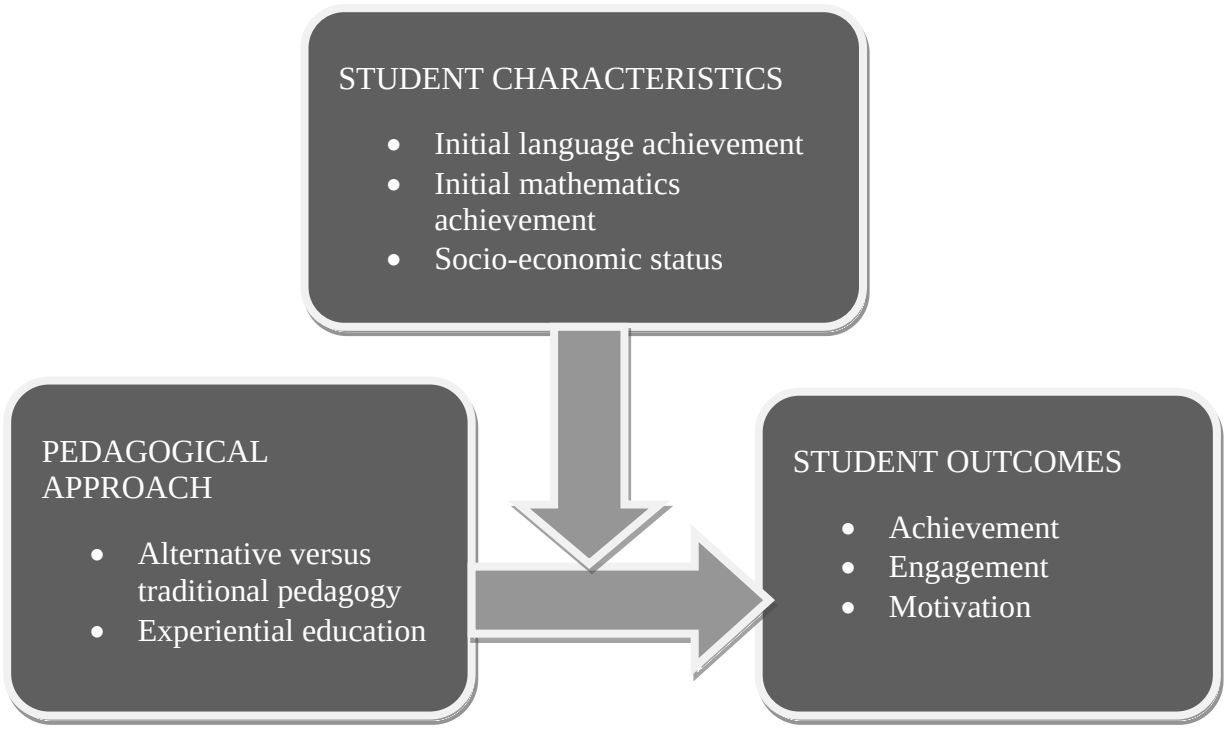

Figure 2. **Conceptual framework of this doctoral dissertation.**

4.2. THE SIBO DATA

Data from the SiBO project (SiBO is the Dutch acronym for School Careers in Primary Education; Maes, Ghesquière, Onghena, & Van Damme, 2002) were used, involving a cohort of pupils followed from their last year in preschool (kindergarten) through primary school and the first year of secondary education. A stratified random sample of 117 schools was drawn from all Flemish primary schools. Besides this 'reference sample', two oversamplings were drawn to increase the amount of schools with a high percentage of at-risk children, and schools with an alternative pedagogical approach. Because of this oversampling, the data contain information about 33 alternative schools: seventeen Freinet schools, five Steiner/Waldorf schools, three Jenaplan schools, three experience-based schools and five life schools.

The SiBO data contains achievement tests (reading fluency, reading comprehension, spelling and mathematics), questionnaires filled out by diverse respondents (child, teacher, parents

and principals) about diverse topics, and observations of teachers and children. Table 1 contains an overview of the most important variables of this dissertation.

Table 1. ***Overview of the most important variables***

Theme	Respondents	Variables/Scales	Chapter
School approach	Principal	Pedagogical approach	3, 4, 5
Teacher approach	Observator	• Autonomy support • Sensitivity • Stimulation • Interest-based activities • Time for choice activities	2
Risk indicators	Parents	• SES	1
	Tests	• Initial language achievement • Initial mathematics achievement	2
School adaptation	Tests	• Mathematics • Language achievement • Reading Fluency • Spelling • Reading Comprehension	2, 3
	Teacher	• Independent functioning • School enjoyment	2, 3
	Pupils	• Effort Expenditure • School enjoyment • Autonomous motivation • Controlled motivation	5

4.3. METHODOLOGY

The data of the SiBO project have a typical nested structure, in which students (level 1) are part of a class (level 2), and classes are nested in schools (level 3; see Figure 3). As a consequence of this nesting, it can no longer be assumed that the data on the student and classroom levels are independent. Also, repeated measurements violate the assumption of independence among observations. To avoid biased estimates, we relied on an analytic strategy which can take into account this nested structure, being multilevel modelling (Snijders & Bosker, 1999).

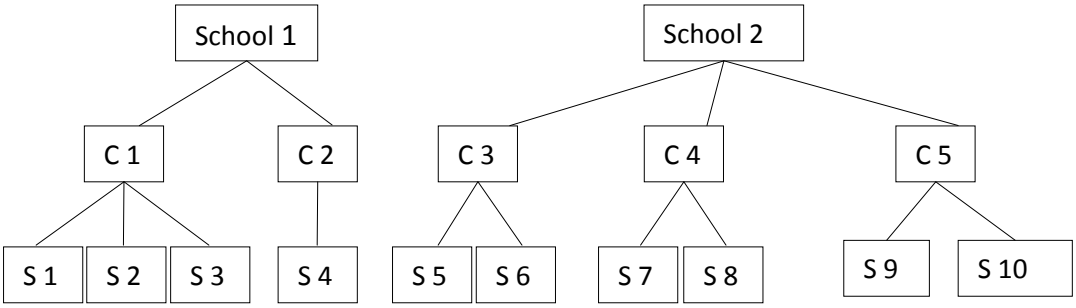

Figure 3. **Nested data structure.** Note. C = classroom; S = student.

To examine longitudinal changes, growth curve models were used. Depending on the number of measurement occasions, linear (two measurement occasions) or quadratic (more than four measurement occasion) curves were estimated. Covariates were entered together with their interaction term to control for differences between schools in student intake characteristic (SES, initial achievement, gender age, etc.). To examine the main effects of alternative education, the alternative method was entered into the model, together with the interaction terms with time, providing information about the main effect of alternative education on student growth over time. To examine differential effects significant interaction terms were used to indicate differential/moderation effects. However, some authors suggest that a correction should be made to make the threshold for significance (in most cases $p < .05$) smaller (for example divide .05 by the number of tested interactions). Finally, simple slopes (Aiken & West, 1991) will be used to examine high and low at-risk children with one standard deviation from the grand mean as the cut-off score. This way, one can evaluate the impact of a specific teaching approach for a group of high or low risk children.

4.4. OVERVIEW OF THE MANUSCRIPTS INCLUDED IN THIS DISSERTATION

MANUSCRIPT 1: SCHOOL ADJUSTMENT IN EXPERIENTIAL KINDERGARTENS.

- Focuses on five factors that characterize experiential education. This study focuses on three aspects of teacher interpersonal style: stimulation, autonomy-support and emotional involvement, and on two aspects related to the classroom organisation:

the level of interest-based activities and materials, and the time spent on choice activities.

- Effects are examined on children's growth in preparatory language and mathematics skills, as well as on teacher-reported school enjoyment and independent functioning.
- Differential effects are examined with SES, initial language achievement and initial arithmetic skills as risk indicators

MANUSCRIPT 2. ACHIEVEMENT IN ALTERNATIVE SCHOOLS

- Compares alternative schools to traditional schools
- Effects are examined on the development of achievement test scores: mathematics, spelling, reading fluency, reading comprehension during primary school
- Differential effects are examined with initial language achievement.

MANUSCRIPT 3. EARLY SCHOOL ENGAGEMENT IN ALTERNATIVE SCHOOLS

- Compares alternative schools to traditional schools
- Effects are examined on children's growth in teacher-reported school enjoyment and independent participation from the third year of preschool to third grade.
- Differential effects are examined with SES and initial language achievement.

MANUSCRIPT 4. ENGAGEMENT AND MOTIVATION IN ALTERNATIVE SCHOOLS

- Compares alternative schools to traditional schools
- Effects are examined on student-reported school enjoyment, effort expenditure, autonomous motivation and controlled motivation in sixth grade and the change in these outcomes in their first year of secondary education.
- Differential effects are examined with initial mathematic achievement.

2

School adjustment in experiential kindergartens

Manuscript submitted as:

de Bilde, J., Boonen, T., Speybroeck, S., Van Damme, J., De Fraine, B., & Goos, M. (Submitted) Experiential practices in kindergarten: Can they increase school adjustment for all children? Submitted for publication in *The Elementary School Journal*.

ABSTRACT

In this study, the impact of several experiential practices and the moderating influence of three early risk indicators (socio-economic status, initial language and arithmetic achievement) were examined. Data were collected on 2,360 kindergartners (139 classes), their parents and their teachers. Hierarchical linear models examined the extent to which experiential practices and children's background characteristics predicted several aspects of children's school adjustment: language and arithmetic achievement, school enjoyment and independent participation. Results indicated that not all experiential practices were related to optimal school adjustment; a stimulating teacher style was related to greater learning gains in academic achievement, but an autonomy-supportive teacher style was related to smaller learning gains in academic achievement, especially among low achieving children.

Keywords: kindergarten, children at-risk, autonomy support, moderation effect, differential effect

During the last century, education gradually developed into a more child-centered, constructivistic way of thinking and teaching. Educationalists have been putting an increasing emphasis on children's needs, experiences and interests. In particular, a child's need for autonomy has become the focus of a wealth of studies. Autonomy became a central concept, not only within social-motivational theories such as the self-determination theory (SDT; Deci & Ryan, 2000), but also in educational practices such as the experiential education approach (Laevers & Heylen, 2003). In other fields of educational research, attention has been given to how the school and/or the teacher might differentially affect the school functioning of at-risk children, defined in terms of socio-economic status (SES) and initial achievement (Strand, 2010). Some teaching practices might have a greater positive influence on the school adjustment of at-risk children compared to their not-at-risk peers. This compensatory effect can decrease the initial gap in school adjustment. Other teaching practices might in contrast confer greater advantages on those who are initially already advantaged, creating an educational "Matthew effect" (education largely benefits the advantaged children and not the disadvantaged children, e.g., Walberg & Tsai, 1983) and increase the gap in school adjustment.

The present study will combine two research traditions. First, in the tradition of educational effectiveness research, we will examine the effects of experiential practices on achievement, school enjoyment and independent participation. Second, in line with studies on differential effects, we will examine possible moderation effects of being at-risk in terms of SES, initial language achievement and initial arithmetic achievement. In other words, we will examine if experiential practices affect the gap between children at risk of school failure and their low-risk peers.

1. EXPERIENTIAL EDUCATION

All children possess inherent motivational sources, such as personal interests, integrated values, and a need for autonomy. The environment can either stimulate these resources or interfere with these inherent motivational resources (Deci & Ryan, 2000; Ryan & Deci, 2000). Experiential teachers create classroom conditions in which these resources stimulate student learning (Reeve, 2006). In this paper, we will examine the impact of experiential education in

kindergarten on children's early school adjustment. School adjustment is defined in terms of school achievement, school affect and attitude, and the involvement or engagement with the school (Birch & Ladd, 1997). To describe what exactly experiential teachers do, a distinction can be made between practices situated at the communicative/interpersonal level (i.e., the teacher's interpersonal style) and aspects of the learning environment, such as time for choice activities and interest-based activities (for an overview see Reeve, 2006; Reeve, Deci, & Ryan, 2004). We will now discuss the important aspects of both teachers' interpersonal style (the communicative level) and instructional activities (the organizational level; See Figure 4 for an overview).

1.1. TEACHER'S INTERPERSONAL STYLE

Three dimensions of a teacher's interpersonal style that have been reported to reflect an experiential approach are considerd here: stimulation, autonomy support and emotional support (Laevers & Heylen, 2003). *Stimulation* refers to the attempts teachers make to trigger a sense of interest, curiosity, enjoyment or challenge. Stimulating teachers provide children with opportunities to analyse, reason, create, and integrate knowledge. For example, they ask intriguing questions that stimulate children's thinking, invite children to communicate and introduce activities in a motivating way (Laevers & Heylen, 2003). Through instructional conversation, stimulating teachers improve children's concept development (Kazemi & Stipek, 2001). Within the developmental framework (Hamre & Pianta, 2005), this dimension could be considered as an aspect of 'instructional support'. A high level of stimulation has been positively associated with observed involvement and on-task behaviour among kindergartners (Pianta, La Paro, Payne, Cox, & Bradley, 2002; Van Heddegem, Laevers & Van Damme, 2004), observed positive interactions with teachers and peers among first graders (NICH ECCRN, 2002), and mathematic and language achievement in pre-kindergarten and kindergarten (Curby, LoCasale-Crouch et al., 2009; Pianta et al., 2002). However, the latter association was not always found among all children (Curby, Rimm-Kaufman, & Cameron Ponitz, 2009; Hamre & Pianta, 2005).

The second dimension, *autonomy support*, pertains to the teacher's efforts to adopt an open, non-controlling attitude in which children's thoughts, opinions and interests are taken

into account. Teachers who support autonomy try to involve children in decision-making processes and in the resolution of conflicts, provide rationales for uninteresting activities, etc. (Laevers & Heylen, 2003; Reeve, 2006; Reeve & Jang, 2006). Elementary school children in classrooms taught by autonomy-supportive teachers have greater perceived competence, self-worth, and interest in the learning material (Deci, Schwartz, Scheinman, & Ryan, 1981; Ryan & Grolnick, 1986), enhanced creativity (Koestner, Ryan, Bernieri, & Holt, 1984), increased conceptual understanding, and decreased deterioration of recall of a read text (Grolnick & Ryan, 1987), compared to children in classrooms taught by more controlling teachers. Among kindergartners or elementary school children, no association has yet been found between autonomy support and observed involvement or self-reported test effort (Grolnick & Ryan, 1987; Van Heddegem et al., 2004), in contrast to studies among high-school or university students (Reeve, Jang, Carrell, Jeon, & Barch, 2004).

Emotional support refers to the way in which teachers are sensitive toward their students' feelings, experiences and emotions, and encompasses teacher's warmth, involvement, respectfulness, and positive affect (Laevers & Heylen, 2003; NICHD ECCRN, 2002). An emotional supportive teacher style has been associated with less conflict and more closeness in the teacher-child relationship during elementary education (Connor, 2010; Hamre & Pianta, 2005), observed positive interactions with peers, teacher-rated social competence, greater observed engagement and on-task behaviour during kindergarten (NICHD ECCRN, 2002; Pianta et al., 2002; Van Heddegem et al., 2004), and higher language and mathematic achievement academic achievement among kindergartners and first graders (Hamre & Pianta, 2005; Pianta et al., 2002).

1.2. INSTRUCTIONAL ACTIVITIES

Instructional activities can have the potential to either support or impede children's active nature and self-determined strivings. One way to increase children's sense of enjoyment and improve their learning is to provide a rich environment with *interest-based activities* that trigger, or build upon, their interests and preferences (Hidi, 1990; Van Herpen, 2005). For example, teachers can create open projects in which themes can be explored that are inspired by the interests of the children (e.g., dinosaurs, princesses; Laevers & Heylen, 2003).

Learning activities and materials that are embedded in interest-based fantasy contexts positively influenced elementary school children's self-reported intrinsic motivation, perceived competence, task involvement, and performance (Cordova & Lepper, 1996; Parker & Lepper, 1992).

Another way a teacher can support a child's experience of autonomy and free initiative is to provide *time for choice activities* which allows children to express their personal values, goals, or interests. In Flemish kindergartens, choice is usually given by working with different centers (e.g., book center, play center, arts center). Most studies among elementary school children suggest that the possibility to make choices resulted in positive outcomes in terms of intrinsic motivation, task involvement, perceived competence and performance (Cordova & Lepper, 1996; Patall, Cooper, & Robinson, 2008; Reynolds & Simons, 2001). However, choice is only motivating when the choice options are limited and cognitively not too complex. In their meta-analysis, Patall, Cooper, and Robinson (2008) evidenced that choice had the greatest effect on intrinsic motivation when participants were provided with three to five options (limited-choice), compared to having only two or more than five (free-choice) options.

2. THE MODERATING ROLE OF EARLY RISK INDICATORS

Three variables are considered to define to what extent children are at risk of a maladaptive school trajectory: SES, initial language achievement and initial arithmetic achievement. *SES* is a demographic variable and pertains to certain variables that are reliable indicators of a child's family background: parental educational level, parental professional status, and/or family income. Children from a lower socio-economic background are exposed to multiple risk factors that can influence their development, such as family stress, neighbourhood violence, or differences between the home and the school environment (e.g., Aikens & Barbarin, 2008). *Initial language achievement* is another often-used measure to indicate which children are at risk of later school problems. Kindergartners who already fall behind in terms of speaking or listening skills, might not be poised to understand and learn from reading or mathematic instruction, and therefore might not be able to take advantage of learning opportunities leading to later reading, spelling and arithmetic difficulties (Smart,

Prior, Sanson, & Oberklaid, 2001). *Initial arithmetic achievement* is not only a strong predictor of later arithmetic difficulties, but it is also a strong predictor of later reading achievement (Duncan et al., 2007; Stock, Desoete, & Roeyers, 2009). Some authors suggest that initial arithmetic achievement is linked to performance IQ, perhaps reflecting the abstract problem solving cognitive capacities inherent in both tasks (Smart, Prior, Sanson, & Oberklaid, 2001).

Only few studies examined moderation effects regarding to experiential educational practices. Moderation effects with SES or initial achievement have been studied with stimulating and emotional supportive teacher style (e.g., Hamre & Pianta) and the offer of choice (e.g. Iyengar & Lepper, 1999). First, some studies suggest that a teacher's level of *stimulation* might more positively affect school achievement among at-risk children compared to their low-risk peers. A highly stimulating teacher style had a more positive impact on school achievement outcomes for first-graders with a low-SES background (Hamre & Pianta, 2005), and first-graders with low initial preparatory reading skills (Curby, Rimm-Kaufman et al., 2009), compared to their low-risk peers. Similary, most authors suggest that a teacher's emotional support can compensate for the impact of risk indicators such as low initial achievement, low SES, and multiple other functional risk indicators, on kindergartners' school adjustment (Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008; Hamre & Pianta, 2005). For example, Hamre and Pianta (2005) found that among first graders with multiple functional risks (such as low social or academic competence) teacher's emotional support was positively associated with school achievement and with less conflict in the teacher-child relationship. This association was not found among low-risk children. However, a study of Curby, Rimm-Kaufman and Cameron Ponitz (2009) showed that only initially high achieving children benefited from emotional supportive teachers in terms of their increase in preparatory reading achievement, whereas children with low initial scores scored higher in classrooms with less emotional support.

In contrast, studies examining the moderation effects of choice, did not report a compensatory role. Although a wealth of studies has indicated that the perception of autonomy is also beneficial among students from other cultural backgrounds (e.g. Shih, 2008), previous research has also suggested that the effects of providing a *lot of choice time* on students' intrinsic motivation may vary according to their SES or cultural background (Bao

& Lam, 2008; Iyengar & Lepper, 1999; Snibbe & Markus, 2005). Among adult participants, Snibbe and Markus (2005) found that high-SES participants liked chosen objects more than unchosen objects, but choice did not affect low-SES participants' preferences. Similarly, Anglo American elementary school children enjoyed and performed better at tasks in which they had the opportunity to make choices, compared to when choices were made by others or when there was no choice at all. In contrast, Asian children put less emphasis on making choices themselves, and preferred choices made by others they felt related to (Bao & Lam, 2008; Iyengar & Lepper, 1999).

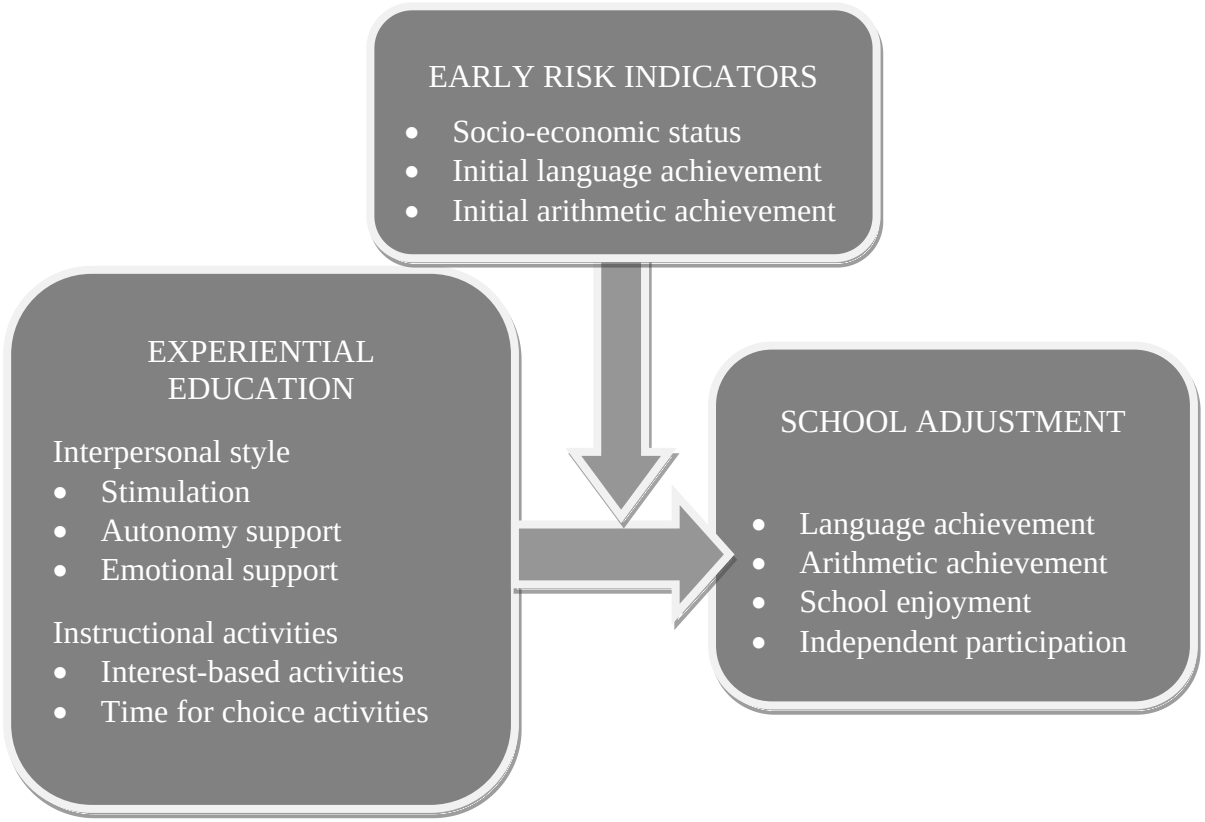

Figure 4. **Conceptual framework of this study.**

3. RESEARCH OBJECTIVES

The present study had two main goals (see Figure 1 for the conceptual framework). First, it was examined whether various experiential practices predict kindergartners' achievement in

arithmetic and language, school enjoyment and independent participation. Because these practices have been generally found to positively predict children's school adjustment, we expected a positive effect of all three dimensions of teacher's interpersonal style, the interest-based activities and the amount of time for limited-choice activities on language achievement, arithmetic achievement, school enjoyment and independent participation.

Second, the question remained whether experiential practices can compensate for the risk of school failure, or whether they increase the gap between low-risk and high-risk children. Moderation effects of children's SES, initial language and arithmetic achievement were examined. However, due to the limited amount of previous research, we did not formulate any a priori hypotheses.

4. METHOD

4.1. PROCEDURE AND PARTICIPANTS

The data we used are part of the SiBO project[1] (Maes, Ghesquière, Onghena, & Van Damme, 2002; see also Buyse, Verschueren, Verachtert, & Van Damme, 2009). This project is a longitudinal study following a cohort of children during kindergarten (the year prior to the transition to elementary education) and their elementary school years in Flanders (the Dutch speaking part of Belgium). In Flanders, kindergarten is considered as a preparatory year, in which kindergarten teachers work on certain developmental goals. Although it is voluntary, 99% of all the children are going to kindergarten on a regularly basis. Within the SiBO project, data were collected from parents, teachers, principals and children. The present study involves data collected in the school year 2002-2003, when children (age 5-6) were in kindergarten (the year before elementary school). During that school year there were several measurement occasions. At the beginning (September) and end of the school year (May), achievement tests were conducted. In February, a questionnaire was sent to every teacher, asking them to make a judgment on the functioning of each child. The parental questionnaire was sent to all parents in February.

[1] SiBO is the Dutch acronym for School Careers in Primary Education

From the 198 kindergarten schools involved in the SiBO project, 103 schools were randomly selected and asked to take part in an additional observation study. In 92 schools, with 2,360 children in 139 classes, observations were conducted. In February, all observers participated in a training day. During their training, observers received instructions on how to use the observation instruments, exercised with video fragments, and got feedback on their scoring of the video-fragments. The observations took place in or around March. Each classroom was observed during two days in which different aspects of the teacher's interpersonal style and the instructional activities in the class were examined. 162 observers were involved, both the observers and the teachers were unaware of the study hypotheses. Most classes were observed by student teachers (63%), for whom the observations were part of their curriculum. Besides the student-observers, experienced educationalists were also involved in undertaking observations. Although the student observers were much less experienced in performing observations than the expert observers, there were no large differences between the two groups in terms of the mean and standard deviation of the variables. About 30% of all the classrooms involved in the study were observed by two observers who were instructed to observe independently. Among these classes, 2 inter-rater reliability statistics were calculated. At the scale level, the inter-rater correlation coefficients are very high and ranged between .87 (Interest-based activities) and .96 (Percentage of time devoted to limited-choice activities). At the item level, Kappa statistics were calculated. Most items (64% of the items), had substantial or perfect (Kappa > .60) inter-rater reliability, 21% of the items had moderate inter-rater reliability (Kappa > .40), and 5% of the items had poor inter-rater reliability (Kappa > .30). Of 10% of the items the Kappa statistic could not be calculated due to unsymmetrical data.

The children's mean age at the start of the observations was 5 years and 10 months (retained children were also included in the analysis). There were equal numbers of boys and girls in the study (51% boys). The children in the observation sample did not differ significantly from the children from the larger representative SiBO sample; the average SES (0.03 vs. 0.00), initial language achievement (44.80 vs. 44.42) and initial arithmetic achievement (43.02 vs. 43.22) were similar.

4.2. MEASURES

4.2.1. AUTONOMY SUPPORTIVE PRACTICES.

To measure different aspects of a *teacher's interpersonal style,* the Adult Style Observation Schedule (ASOS; Laevers & Heylen, 2003) was shortened. Three aspects of teacher's interpersonal style were measured: stimulation, autonomy support, and emotional support. Observers rated the individual teacher's behaviour on a scale from 1 to 4, once every day (for more information, see Van Heddegem, Gadeyne, Vandenberghe, Laevers, & Van Damme, 2004). Six items measured the extent of stimulation on the part of the teacher (e.g., 'This teacher does not introduce activities in a motivating way' vs. 'This teacher introduces activities in a motivating way'; α = .93, stability between day 1 and day 2 = .71, inter-rater reliability coefficient = .93). Five items measured autonomy support (e.g., 'This teacher does not respond to what the students want and what they find interesting' vs. 'This teacher listens to what children want and respects their choices'; α = .92, stability = .60, inter-rater reliability coefficient = .90). Six items assessed the teacher's emotional supportiveness (e.g., 'This teacher criticizes and discourages children' vs. 'This teacher gives affirmation and enhances self-confidence'; α = .92, stability = .60, inter-rater reliability coefficient = .87).

To evaluate to which extent teachers incorporated *interest-based activities* (i.e. activities and materials based the interests of their pupils), on the second observation day observers asked the teachers about six (past or current) projects in the class, and evaluated the material according to whether or not it reflected children's interests. This was done on a scale of 1 to 4, with 1 representing a traditional approach (only standard theme projects like 'spring' or 'the farm' are used; the classroom material does not change according to individual interests) and 4 representing an approach based on the interests of the children (activities are original and based on an incident that happened at home or something they saw on television; the classroom material changes according to individual interests). Internal consistency (α = .97) and the inter-rater reliability (r = .86) was high. Remarkably, the average score was low (see Table 2) indicating that most teachers used a rather traditional approach and did not make much use of students' interests in setting up projects and finding materials (for more information, see Van Heddegem et al., 2004).

To calculate *the amount of time for choice activities*, the observers evaluated throughout the day whether each activity block was either an obligatory activity, a limited-choice activity (with a maximum of four choice options) or free-choice activity (five or more choice options) and noted the duration of these blocks. The amount of time devoted to limited-choice and free-choice during the two observation days was calculated, and this duration was then compared to the overall duration of the instructional time of the two day period, resulting in two variables indicating the percentage of time devoted to limited-choice activities and free-choice activities. Activities such as lunch and cleaning up were not included in the calculation. The correlations between day 1 and day 2 were .30 and .40 (for more information see Van Heddegem et al., 2004), also Cronbach's alpha's indicate poor internal stability (.43 for limited choice activities and .60 for free-choice activities).

4.2.2. EARLY RISK INDICATORS

The construction of *the SES variable* was based on the parental questionnaire which contained items about the family's social, cultural and economic characteristics. The SES variable in this study was based on five components: the educational level of the mother and the father, the mother's and father's professional status, and the family income (see Reynders, Nicaise, & Van Damme, 2005 for a detailed description). The educational level varied from 1 (no diploma or diploma elementary education) to 5 (college degree), the professional level ranged between 1 (no profession/never worked) to 7 (manager or other high function). First, the mother's and father's educational level as well as their professional status were averaged. Second, a combined variable based on the three remaining variables was created through factor analysis. Finally, this SES variable was standardized.

Children's *initial language and arithmetic achievement* were assessed at the beginning (September) of the school year (Verachtert, 2003). The test of language achievement was a shortened version of the Flemish adaptation of the original Dutch test (Van Kuyk, 2003) and assessed children's listening skills (e.g., "Bart lives in a house with a pitched roof. Put a cross under the correct picture"), auditory synthesis skills (e.g., "Here you see shoe-boot-sock. Put a cross under s-o-c-k"), writing orientation skills (e.g., "Put a line under the middle letter of this word"), sounds and rhyme skills (e.g., "Here you see mouse-bird-monkey-cat. Which

Table 2. ***Psychometric Properties and Correlations of the Major Variables***

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*N*[a]	*M*	*SD*	*Min*	*Max*	*Skew*	*Kurt*
Child level															
Covariates															
1. Gender	_								2360	0.51	0.50	0.00	1.00	-0.04	-2.00
2. Age (months)	.04	_							2249	69.94	4.01	53.00	87.00	0.53	0.71
3. SES	.01	-.09***	_						2140	0.03	0.87	-2.19	2.07	-0.07	-0.59
4. Initial language a.	-.07***	.15***	.39***	_					2264	44.80	10.57	9.01	69.05	-0.55	-0.12
5. Initial arithmetic a.	-.02	.16***	.47***	.78***					2252	43.02	9.82	10.49	61.44	-0.31	-0.56
Outcomes															
6. Language a.	-.09***	.07***	.35***	.71***	.72***	_			2238	52.15	9.19	17.52	71.80	-0.36	0.16
7. Arithmetic a.	.01	.08***	.46***	.73***	.84***	.75***	_		2223	51.52	8.83	22.52	67.98	-0.36	-0.42
8. School enjoyment	-.13***	.07**	.15***	.26***	.26***	.25***	.24***	_	2250	4.96	0.74	1.50	6.00	-0.67	0.56
9. Independent p.	-.10***	.11***	.34***	.54***	.58***	.56***	.58***	.48***	2250	3.86	1.15	0.12	6.00	-0.28	-0.37
Class level															
Teacher's interpersonal style															
1. Stimulation	_								133	3.09	0.58	1.38	4.00	-0.84	0.37
2. Autonomy support.	.57***	_							132	2.84	0.61	1.00	4.00	-0.36	-0.38
3. Emotional support	.64***	.63***	_						133	3.22	0.54	1.50	4.00	-0.69	-0.04
Instructional activities															
4. Interest-based	.30***	.40***	.16***	_					135	2.02	0.74	0.41	4.00	0.71	0.02
5. Limited-choice	-.11***	-.25***	-.16***	-.05***	_				120	0.16	0.15	0.00	0.64	0.87	0.45
6. Free-choice	.24***	.47***	.24***	.22***	-.55***				121	0.26	0.18	-0.11	0.67	0.27	-0.85

Note. SES = Socio-economic status, a. = achievement, p. = participation, Skew = Skewness, Kurt = Kurtosis. Psychometric properties and correlations of the main study variables after imputation are displayed.

[a] Number of observations before imputation.

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

word starts with a b?") and skills in hearing the first and last word (e.g., "Which word do I say the last? Hand-Mouth-Eye-Foot"). The test of arithmetic achievement (Verachtert & Dudal, 2004) included the assessment of counting (e.g., "Draw five circles in the flag"), measuring and arithmetic language (e.g., "Which robe is the shortest?", "Find the triangle in the row"), comparing quantities (e.g., "Draw a cross under the mushroom with most dots"), and understanding concepts of place and order (e.g., "Find the second car in the row"). Both tests contained 40 items. Internal consistencies were high with Cronbach's alpha's of .86 (initial language achievement) and .93 (initial arithmetic achievement).

4.2.3. SCHOOL ADJUSTMENT

The *language and arithmetic achievement tests* used at the end of the school year (May) were largely the same as the tests used at the begin of the school year (Verachtert, 2003). In order to make the test at the end of the year more difficult some items were changed. All test scores were calibrated to create one scale for language achievement and one scale for arithmetic achievement. Internal consistencies were high as Cronbach's alpha's were .86 (language achievement) and .92 (arithmetic achievement).

In February, the kindergarten teacher filled in a questionnaire for each child in his class, in which he evaluated the child's *school enjoyment* and *independent participation* (Maes, 2003) on a 6-point Likert-scale. Four items tapped school enjoyment (e.g., 'This child does not like school'; α = .82). To measure independent participation in class, we used a shortened translated version of the scale 'independent participation' from the 'Teacher Rating Scale of School Adjustment' (Birch & Ladd, 1997; Cornelissen & Verschueren, 2002). This scale contained four items (e.g. 'This child is self-determined and sets his\her own goals', α = .81).

4.3. DATA ANALYSIS

We distinguished two levels in the data, the child level (level 1) and the class level (level 2). Because we wanted to examine both the impact of child and class characteristics as well as their interaction effects, analyses were conducted using hierarchical linear regression modelling (Bryk & Raudenbush, 2002; Snijders & Bosker, 1999) with MLwiN. This analytical

technique was especially designed to analyze variables from different levels simultaneously. All the models were fitted using a maximum likelihood (ML) method known as IGLS (Iterative Generalized Least Squares). Because we wanted to interpret the variables in terms of the total population, all explanatory variables were centred around the grand mean except for gender, which was dummy coded with girls as the reference category. The selected explanatory variables at each level are specified below (see Results).

Furthermore, patterns of missing data were analyzed. Because there was not enough evidence that data were missing completely at random (MCAR) (Little's MCAR test χ^2 (14022) = 28407, $p < .001$), and because of the generally low percentages of missingness (see Table 1, ranging from 0% to 14%), missing data were imputed. Single level imputation was used with the Expectation Maximalization (EM) algorithm in SPSS 16.0, following the guidelines of Baraldi and Enders (2010) and Graham (2009). Furthermore, data were screened to examine the integrity of the models. To avoid violations of assumptions, all variables (see Table 1) and the residuals at both level 1 and 2 were tested for normality and outliers.

Five models were created in different steps. First, unconditional models were tested in which the total variance was partitioned into a component at each level (i.e., child and class level, Model 1). Second, child-level covariates (i.e., gender, age, SES, initial language and arithmetic achievement) were entered simultaneously as fixed effects into the model (Model 2). To address our first research goal and examine the effect of experiential practices (class-level variables) on school adjustment, models were created by entering all experiential practices simultaneously into model 2, so that model 3 consists of all experiential practices. To address our second research goal, that is, to evaluate the moderating role of early risk indicators in the association between experiential classroom practices and school adjustment, we used model 2 as a starting point and allowed the slopes of the child level predictors SES, initial language achievement and initial arithmetic achievement to vary among classes (Model 4). The existence of such random effects of child level variables at the class level are a strong indication for the existence of cross-level interaction effects between these child-level and class-level variables (Snijders & Bosker, 1999). Finally, interaction effects were tested using a forward stepwise model building strategy so that Model 5 contained significant interaction effects and their constitutive terms.

5. RESULTS

5.1. PRELIMINARY ANALYSES

Descriptive statistics of all variables and their correlations are presented in Table 2. Several preliminary hierarchical models were created. In a first step, the unconditional hierarchical models showed substantial amounts of intra-class correlation (ICC): 18.70% (=15.83/(67.81+15.83)) of the total variance in language achievement, 23.64% of the total variance in arithmetic achievement, 21.82% of the total variance in school enjoyment, and 12.03% of the total variance in independent participation was situated at the class level (see Model 1 in Tables 3-6).

In a second step, the inclusion of the covariates gender, age, SES, initial language and initial arithmetic achievement (see Model 1 in Tables 3-6) led to an improved model fit for all aspects of school adjustment (language achievement: $\chi^2(5) = 2059$, $p < .001$; arithmetic achievement: $\chi^2(5) = 3095$, $p < .001$; school enjoyment: $\chi^2(5) = 357$, $p < .001$; independent participation: $\chi^2(5) = 1370$, $p < .001$). Gender was a significant predictor of all outcomes. Boys scored lower in terms of school enjoyment, independent participation and language achievement than girls, whereas girls scored lower in arithmetic achievement. Age was a significant negative predictor of language achievement, arithmetic achievement and independent participation. SES was a significant positive predictor of arithmetic achievement, school enjoyment and independent participation. Initial language and arithmetic achievement were significant predictors of all outcomes.

5.2. EXPERIENTIAL PRACTICES PREDICTING SCHOOL ADJUSTMENT

To test our first hypothesis, models were created by entering all 5 predictors (stimulation, autonomy support, emotional support, interest-based activities and limited time for choice activities) to model 2. The results of Model 3 are displayed in Tables 3-6. Since no experiential practice could significantly predict independent participation, model 3 is the same as model 2. Compared to model 2, the inclusion of the class-level variables predicted 14.81% of the class-level variance of language achievement, 17.87% of the class-level

Table 3. ***Fixed effects Estimates and Variance-Covariance estimates for Models predicting Language Achievement***

	Language Achievement														
	Model 1			Model 2			Model 3			Model 4			Model 5		
	B		SE	B		SE	B		SE	B		SE	B		SE
Fixed parameters															
Intercept (β_0)	52.25	***	-0.38	52.62	***	0.27	52.65	***	0.26	52.59	***	0.27	52.56	***	0.26
Age (in months) (β_1)				-0.12	***	0.03	-0.12	***	0.03	-0.12	***	0.03	-0.12	***	0.03
Gender (β_2)				-0.95	***	0.23	-0.95	***	0.23	-0.96	***	0.22	-0.96	***	0.22
SES (β_3)				0.03		0.16	0.07		0.16	0.00		0.16	0.08		0.16
ILA (β_4)				0.36	***	0.02	0.36	***	0.02	0.37	***	0.02	0.36	***	0.02
IAA (β_5)				0.39	***	0.02	0.39	***	0.02	0.39	***	0.02	0.39	***	0.02
Stimulation (β_6)							2.15	***	0.55				1.93	***	0.55
Autonomy support (β_7)							-0.85		0.55				-0.71		0.55
Emotional support (β_8)							-0.56		0.64				-0.45		0.63
Interest-based activities (β_9)							-0.64		0.34				-0.66	*	0.33
Perc. limited choice (β_{10})							-1.67		1.64				-1.63		1.62
Autonomy enc.ILA (β_{12})													0.08	***	0.02
Random parameters															
Class level															
CONS.CONS (τ^2_0)	15.83	***	2.43	6.55	***	1.01	5.58		0.89	6.15	***	0.98	5.48		0.88
SES.SES (τ^2_3)										0.00		0.00			
ILA.ILA (τ^2_4)										0.02	***	0.01			
IAA.IAA (τ^2_5)										0.02		0.01			
CONS.SES ($\tau_{0\,3}$)										0.00		0.00			
CONS.ILA ($\tau_{0\,4}$)										-0.15		0.06			
SES.ILA ($\tau_{3\,4}$)										0.00		0.00			
CONS.IAA ($\tau_{0\,5}$)										0.04		0.06			
SES.IAA ($\tau_{3\,5}$)										0.00		0.00			
ILA.IAA ($\tau_{4\,5}$)										-0.01		0.01			
Child level (σ^2_0)	67.81	***	2.04	28.35	***	0.85	28.32		0.85	27.07		0.85	28.14		0.84
% Reduction in variance															
Class level (τ^2_0)							14.81%						1.79%		
Child level (σ^2_0)							0.11%						0.64%		
*-2*Log likelihood*	16865			14806			14786			14774			14770		

Note. SES = Socio – economic status, ILA = Initial language achievement, IAA = Initial arithmetic achievement, enc. = encouragement.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. ***Fixed effects Estimates and Variance-Covariance estimates for Models predicting Arithmetic Achievement***

	Aritmetic Achievement														
	Model 1			Model 2			Model 3			Model 4			Model 5		
	B		SE	B		SE	B		SE	B		SE	B		SE
Fixed parameters															
Intercept (β_0)	51.67	***	0.40	51.20	***	0.20	51.20	***	0.19	51.14	***	0.20	51.15	***	0.19
Age (in months) (β_1)				-0.10	**	0.02	-0.10	***	0.02	-0.10	***	0.02	-0.10	***	0.02
Gender (β_2)				0.61	**	0.17	0.62	***	0.17	0.62	***	0.17	0.62		0.17
SES (β_3)				0.58	***	0.12	0.61	***	0.12	0.62	***	0.12	0.61	***	0.12
ILA (β_4)				0.15	***	0.01	0.15	***	0.01	0.15	***	0.01	0.16	***	0.01
IAA (β_5)				0.62	***	0.02	0.62	***	0.02	0.62	***	0.02	0.62	***	0.02
Stimulation (β_6)							1.27	**	0.40				1.10	**	0.39
Autonomy support (β_7)							-1.06	**	0.40				-0.83	*	0.40
Emotional support (β_8)							0.33		0.46				0.33		0.46
Interest-based activities (β_9)							-0.33		0.24				-0.37		0.24
Perc. limited choice (β_{10})							-3.76	**	1.19				-3.67	*	1.17
Stimulation.IAA (β_{11})													-0.06	***	0.02
Autonomy enc.ILA (β_{12})													0.05	***	0.02
Random parameters															
Class level															
CONS.CONS (τ^2_0)	18.28	***	2.66	3.47	***	0.54	2.85		0.47	3.16	***	0.51	2.77		0.46
SES.SES (τ^2_3)										-0.05	*	0.20			
ILA.ILA (τ^2_4)										0.00	*	0.00			
IAA.IAA (τ^2_5)										0.00	*	0.00			
CONS.SES ($\tau_{0\,3}$)										-0.26		0.23			
CONS.ILA ($\tau_{0\,4}$)										-0.03		0.03			
SES.ILA ($\tau_{3\,4}$)										-0.02		0.02			
CONS.IAA ($\tau_{0\,5}$)										-0.01		0.03			
SES.IAA ($\tau_{3\,5}$)										-0.02		0.02			
ILA.IAA ($\tau_{4\,5}$)										0.01		0.00			
Child level (σ^2_0)	59.06	***	1.77	16.19	***	0.49	16.14		0.49	15.78	***	0.50	16.04		0.48
% Reduction in variance															
Class level (τ^2_0)							17.87%						2.81%		
Child level (σ^2_0)							0.31%						0.62%		
*-2*Log likelihood*	16570			13475			13448			13429			13431		

Note. SES = Socio – economic status, ILA = Initial language achievement, IAA = Initial arithmetic achievement, enc. = encouragement.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5. ***Fixed effects Estimates and Variance-Covariance estimates for Models predicting School Enjoyment***

	School Enjoyment											
	Model 1			Model 2			Model 3/5			Model4		
	B		SE	B		SE	B		SE	B		SE
Fixed parameters												
Intercept (β_0)	5.00	***	0.03	5.10	***	0.04	5.09	***	0.04	5.10	***	0.04
Age (in months) (β_1)				0.01		0.00	0.01		0.00	0.01		0.00
Gender (β_2)				-0.19	***	0.03	-0.19	***	0.03	-0.19	***	0.03
SES (β_3)				0.06	**	0.02	0.06	***	0.02	0.06	**	0.02
ILA (β_4)				0.01	***	0.00	0.01	***	0.00	0.01	***	0.00
IAA (β_5)				0.02	***	0.00	0.02	***	0.00	0.01	***	0.00
Stimulation (β_6)							0.03		0.08			
Autonomy support (β_7)							-0.17	*	0.08			
Emotional support (β_8)							0.05		0.09			
Interest-based activities (β_9)							0.08		0.05			
Perc. limited choice (β_{10})							-0.01		0.24			
Random parameters												
Class level												
CONS.CONS (τ^2_0)	0.12	***	0.02	0.14	***	0.02	0.13	***	0.02	0.13	***	0.02
SES.SES (τ^2_3)										0.00		0.01
ILA.ILA (τ^2_4)										0.00		0.00
IAA.IAA (τ^2_5)										0.00		0.00
CONS.SES ($\tau_{0\,3}$)										0.01		0.01
CONS.ILA ($\tau_{0\,4}$)										0.00		0.00
SES.ILA ($\tau_{3\,4}$)										0.00		0.00
CONS.IAA ($\tau_{0\,5}$)										0.00		0.00
SES.IAA ($\tau_{3\,5}$)										0.00		0.00
ILA.IAA ($\tau_{4\,5}$)										0.00		0.00
Child level (σ^2_0)	0.43	***	0.01	0.36	***	0.01	0.36	***	0.01	0.35	***	0.01
% Reduction in variance												
Class level (τ^2_0)							7.14%					
Child level (σ^2_0)							0.00%					
*-2*Log likelihood*	4919			4565			4559			4537		

Note. SES = Socio – economic status, ILA = Initial language achievement, IAA = Initial arithmetic achievement, enc. = encouragement.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6. ***Fixed effects Estimates and Variance-Covariance estimates for Models predicting Independent Participation***

	Independent Participation														
	Model 1			Model 2/3			Model 3			Model 4			Model 5		
	B		SE	B		SE	B		SE	B		SE	B		SE
Fixed parameters															
Intercept (β_0)	3.88		0.04	3.96	***	0.05	3.96	***	0.05	3.95	***	0.05	3.96	***	0.05
Age (in months) (β_1)				0.01	*	0.00	0.01	*	0.00	0.01	**	0.00	0.01	*	0.00
Gender (β_2)				-0.17	***	0.03	-0.17	***	0.03	-0.18	***	0.03	-0.17	***	0.03
SES (β_3)				0.13	***	0.02	0.13	***	0.02	0.14	***	0.03	0.14	***	0.02
ILA (β_4)				0.03	***	0.00	0.03	***	0.00	0.03	***	0.00	0.03	***	0.00
IAA (β_5)				0.05	***	0.00	0.05	***	0.00	0.05	***	0.00	0.05	***	0.00
Stimulation (β_6)							-0.02		0.10				-0.03		0.10
Autonomy support (β_7)							-0.05		0.10				-0.12		0.10
Emotional support (β_8)							0.00		0.12				0.02		0.12
Interest-based activities (β_9)							-0.04		0.06				-0.05		0.06
Perc. limited choice (β_{10})							0.51		0.30				0.77	*	0.32
Free-choice (β_{13})													0.58	*	0.27
Free-choice.IAA (β_{14})													0.03	***	0.01
Random parameters															
Class level															
CONS.CONS (τ^2_0)	0.16	***	0.03	0.23	***	0.03	0.22	***	0.03	0.20	***	0.03	0.20		0.03
SES.SES (τ^2_3)										0.01		0.01			
ILA.ILA (τ^2_4)										0.00	*	0.00			
IAA.IAA (τ^2_5)										0.00	*	0.00			
CONS.SES ($\tau_{0\,3}$)										0.00		0.01			
CONS.ILA ($\tau_{0\,4}$)										0.00		0.00			
SES.ILA ($\tau_{3\,4}$)										0.00		0.00			
CONS.IAA ($\tau_{0\,5}$)										0.00		0.00			
SES.IAA ($\tau_{3\,5}$)										0.00		0.00			
ILA.IAA ($\tau_{4\,5}$)										0.00		0.00			
Child level (σ^2_0)	1.17	***	0.04	0.62	***	0.02	0.62	***	0.02	0.58	***	0.02	0.62		0.02
% Reduction in variance															
Class level (τ^2_0)							4.35%						9.09%		
Child level (σ^2_0)							0.00%						0.32%		
*-2*Log likelihood*	7217			5847			5842			5802			5825		

* *Note.* SES = Socio – economic status, ILA = Initial language achievement, IAA = Initial arithmetic achievement, enc. = encouragement.
$p < .05$. ** $p < .01$. *** $p < .001$.

variance in arithmetic achievement, 7.14% of the class-level variance in school enjoyment and 4.35% of the class-level variance in independent participation. The inclusion of experiential practices significantly improved model fit for language ($\chi^2(5) = 20$, $p < .01$) and arithmetic achievement: ($\chi^2(5) = 27$, $p < .001$) achievement; but not for school enjoyment ($\chi^2(5) = 6$, *ns*) and independent participation($\chi^2(5) = 5$, *ns*).

Five significant effects were found. Stimulation was positively associated with language achievement and arithmetic achievement. Stimulation can be considered the most important predictor of language and arithmetic achievement, as its inclusion explains 12.12% respectively 7.56% of the total class-level variance. The proportion of the total variance explained (R^2) for each of the class-level predictors was calculated by comparing the class-level variance of model 3 to the class-level variance of the same model without the predictor of interest. Autonomy support was negatively associated with arithmetic achievement and school enjoyment. The inclusion of autonomy support explained 4.92% of the total class-level variance in arithmetic achievement and 2.05% of the total class-level variance in school enjoyment. Finally, the amount of time for limited-choice activities was negatively associated with arithmetic achievement. The amount of time for limited-choice activities explained 6.51% of the total class-level variance in arithmetic achievement.

Considering the size of the effects, what do the results tell us? First, the results demonstrate that a stimulating interpersonal teacher style had a strong positive association with children's language and arithmetic achievement. To indicate the size of these effects, if we assume that the average growth over a 10-month period is 7.35 (52.15 - 44.80) for language achievement and 8.5 (51.52 - 43.02) for arithmetic achievement, than a 1-point increase in stimulation (in terms of the original 4-point Likert scale) equals a 2.93-month gain in language achievement and a 1.49-month gain in arithmetic achievement. Furthermore, the level of autonomy support was significantly negatively related to arithmetic achievement. A 1-point increase in the level of autonomy support equals a 1.25-month delay in arithmetic achievement. Finally, the percentage of time a teacher spent on limited-choice activities was negatively related with arithmetic achievement. A 10% increase in the percentage of time devoted to limited-choice activities equals to a 0.44-month delay in arithmetic achievement.

5.3. THE MODERATING ROLE OF EARLY RISK INDICATORS

The second research question, whether early risk indicators (SES, initial language and initial language achievement) can moderate the impact of experiential practices on children's school adjustment, was examined in several steps. In step 4, class level random parameters were added to model 2, allowing the slopes of SES, initial language and arithmetic achievement to vary randomly among classes (Model 4 in Tables 3-6). The inclusion of the random parameter led to improved model fit (language achievement: $\chi^2(9) = 32$, $p < .001$; arithmetic achievement: $\chi^2(9) = 46$, $p < .001$; school enjoyment: $\chi^2(9) = 28$, $p < .001$; independent participation: $\chi^2(9) = 45$, $p < .001$). The significance of the random parameters was tested using Likelihood Ratio Tests (LRT's); the difference in fit between the model including the random parameter and the model without the random parameter was compared to a χ^2 distribution with three degrees of freedom. The random slope of SES in the prediction of arithmetic achievement varied significantly at the class level. The random slope of initial language achievement was significant in the prediction of language achievement, arithmetic achievement and independent functioning. The random slope of initial arithmetic achievement varied significantly at the class level in the prediction of arithmetic achievement and independent participation.

Because these random slopes indicate possible moderation effects, interactions were tested between the experiential practices and SES, initial language and arithmetic achievement. In the fifth step, each interaction effect was tested in a stepwise model building strategy. To build model 4, each interaction effect was entered in model 3 and only retained when significant. Because of the large number of tested interactions (30 interactions; 6 interactions regarding language achievement, 18 models regarding arithmetic achievement, and 6 models regarding independent functioning), and because of the large sample size, the criterion for considering a interaction effect significant was narrowed down to a *p*-value of .001 or lower.

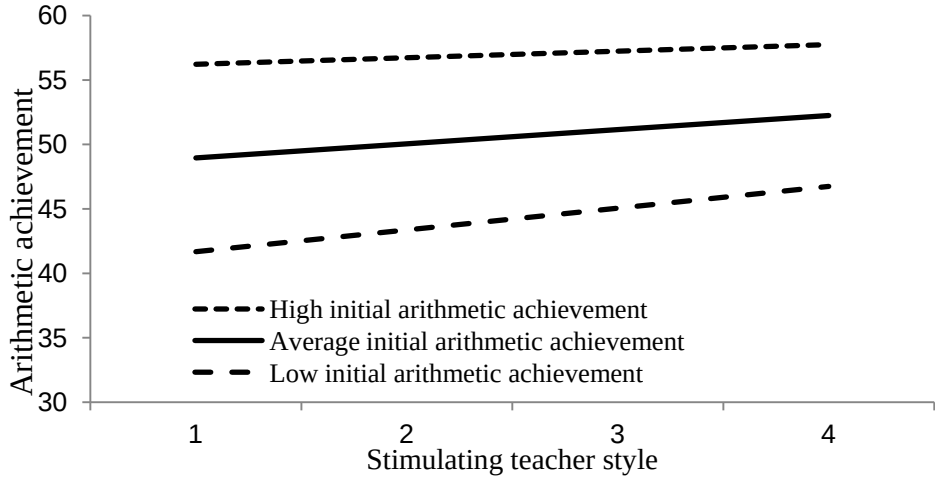

Figure 5. **Relationship between stimulating teacher style and arithmetic achievement for children with initially low (1 SD below the mean), average and high (1 SD above the mean) arithmetic achievement.**

When comparing model 5 to model 3, two additional main effects were significant that lacked significance in model 3. In model 5, the amount of interest-based activities in classroom was negatively related to language achievement (and explained 4.41% of the total class-level variance in language achievement), and the amount of time for limited-choice activities became positively associated with independent participation (3.84 of the total class-level variance explained). Both effects were only marginally significant ($p < .05$).

Four interaction terms were significant. The inclusion of the interaction effects in Model 5 (Tables 3-6) explained a small to substantial amount of both the total class and child-level variance in model 3, as the percentage of reduction in variance varies between 0.32% and 9.09%. Inclusion of the interaction effects led to improved model fit (language achievement: $\chi^2(1) = 16$, $p < .001$; arithmetic achievement: $\chi^2(2) = 17$, $p < .001$; independent participation: $\chi^2(2) = 17$, $p < .001$). First, the results (see Table 4) showed that the association between a teacher's amount of stimulation and arithmetic achievement differed for children with low and high initial arithmetic achievement. The inclusion of this interaction effect explained 2.61% of the class-level and 0.42% of the child-level variance of the model without this interaction term. For children with lower initial arithmetic achievement, the positive impact of a teacher's stimulating style on arithmetic achievement was significantly higher than for children with higher initial arithmetic achievement. To indicate the size of this effect, the

difference in achievement gap between high (1 SD above the mean) and low (1 SD below the mean) initial achievers was diminished by 1.2 arithmetic achievement points (or a 1.41-month gain) when a teacher's stimulation increased by 1 point. Simple slopes analysis (Aiken & West, 1991) revealed that a stimulating style was positively associated with arithmetic achievement for children with low initial arithmetic achievement (-1 SD, B = 1.72, p < .001), while no significant effect of a stimulating style was found for children who had higher initial arithmetic achievement (+1 SD, B = 0.49, *ns*) (see Figure 5).

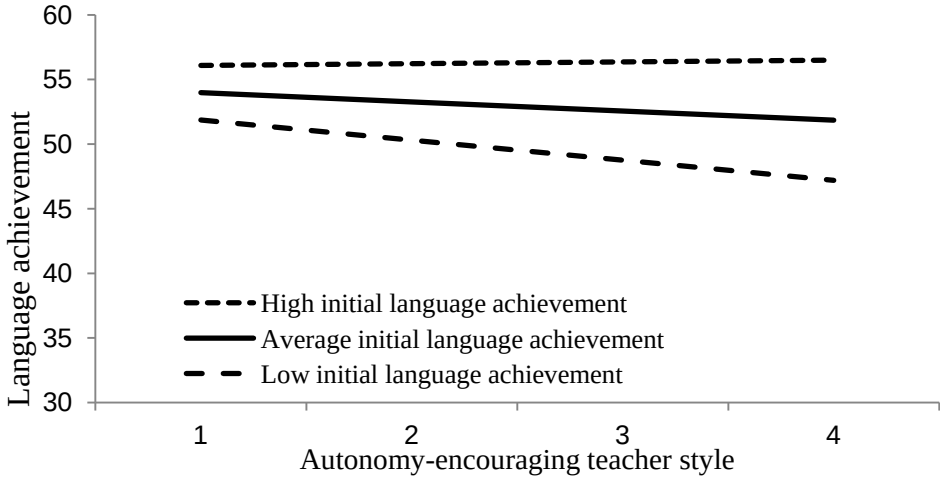

Figure 6. **Relationship between an autonomy-supportive teacher style and language achievement for children with initially low (1 SD below the mean), average and high (1 SD above the mean) language achievement.**

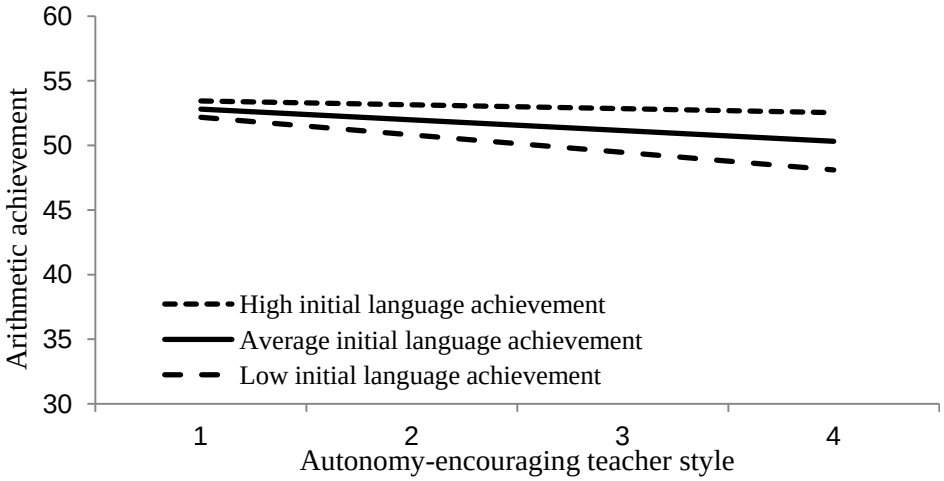

Figure 7. **Relationship between an autonomy-supportive teacher style and arithmetic achievement for children with initially low (1 SD below the mean), average and high (1 SD above the mean) language achievement.**

Second, significant interaction terms indicated that the association between autonomy support and language (see Table 3) or arithmetic achievement (see Table 4), was significantly less negative for higher initial language achievers compared to lower initial language achievers. The inclusion of this interaction effects explained a substantial amount of variance at both the class level variance (1.79% in language achievement, 1.07% in arithmetic achievement) and the child level variance (0.64% in language achievement and 0.50% in arithmetic achievement). The gap between children with one SD below and above the mean of initial language achievement increased by 1.68 points (or more than two months learning gain) in language achievement and 1.05 point (or more than 1 month learning gain) in arithmetic achievement when a teacher scored one point higher in autonomy support. When simple slopes were calculated, autonomy support was negatively associated with language and arithmetic achievement for low initial language achievers (language achievement: B = -1.55, p < .01, arithmetic achievement: B = -1.41, p < .001). No significant association was found between autonomy support and achievement for high initial language achievers (language achievement: B = -0.08, *ns*; arithmetic achievement: B = -0.28, *ns*; see Figures 6 and 7).

With regard to school enjoyment and independent participation, only one interaction effect was significant. The time devoted to free-choice activities positively predict independent participation among average students, and this association significantly varied according to children's initial level of arithmetic achievement (see Figure 8, Table 6). This interaction effect explained 3.38% of the total class-level variance and 0.32% of the total child-level variance. The difference between the independent participation of children with low (-1 SD) versus high (+1 SD) initial arithmetic achievement significantly increased by 0.06 points when a teacher devoted 10% more time to free-choice activities. A high amount of free-choice activities stimulated independent participation among children with high initial arithmetic achievement (B = 0.93, p < .01), but not among children with low initial language achievement (B = 0.23, *ns*).

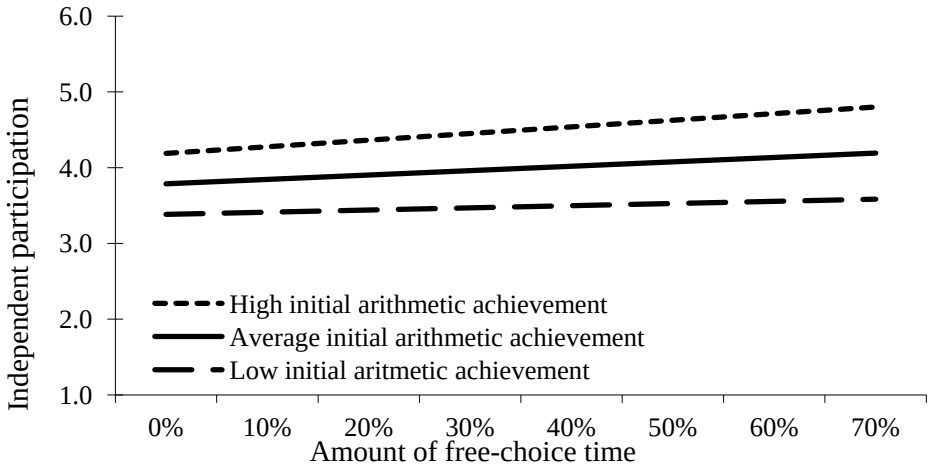

Figure 8. **Relationship between the amount of time for free-choice activities and independent participation for children with initially low (1 SD below the mean), average and high (1 SD above the mean) arithmetic achievement.**

6. DISCUSSION

The effects of child-centred educational practices like experiential education have been the focus of much discussion in the literature (Stipek, 2006). Both positive effects as well as negative effects have been evidenced regarding child-centred educational practices (e.g., Stipek, Feiler, Daniels, & Milburn, 1995; Morrison & Connor, 2002). The present study extends previous research and is unique in three ways. First, it differentiated between various educational practices at both the communicative level (i.e., teachers' interpersonal style) and the organizational level (i.e., instructional activities). Second, we examined whether the impact of these experiential practices depends on child characteristics (i.e., SES, initial language and arithmetic achievement). Third, the data were about kindergartners, an age group in which only limited research is available regarding the effects of autonomy support, interest-based activities and the impact of choice. Nevertheless, kindergartners are at a very important and critical phase in their education (Al Otaiba et al., 2008).

In sum, five findings emerged: (1) teachers' stimulation contributed to all children's language achievement and also to arithmetic achievement among low and average initial arithmetic achievers; (2) an autonomy-supportive teacher style was negatively related to language and arithmetic achievement among children with low initial language achievement and

negatively related to school enjoyment; (3) the amount a teacher spent on interest-based activities tends to be negatively related to language achievement; (4) the amount of time a teacher spent on activities in which children can choose between a maximum of four activities (i.e., time for limited-choice activities) is associated with lower arithmetic achievement, but it tended to be positively associated with independent participation; (5) free-choice was positively related to independent participation among children with high and average initial arithmetic achievement.

6.1. TEACHER'S INTERPERSONAL STYLE

Of all the experiential practices included in this study, a *stimulating teacher style* was the only practice that positively influenced the school achievement of kindergartners, as expected. In accordance with previous studies in early education (Curby, LoCasale-Crouch et al., 2009; Pianta et al., 2002), it was found that higher levels of a stimulating teacher style were strongly associated with higher language and arithmetic achievement at the end of kindergarten. Furthermore, we evidenced that a stimulating teacher style can play an important compensatory role. Although previous studies suggested that a stimulating learning environment has the largest benefits on school achievement for children with low initial language achievement (Curby, Rimm-Kaufman et al., 2009) and low SES (Hamre & Pianta, 2005), this study suggests that the impact of a stimulating teacher style on arithmetic achievement might be moderated by a child's initial arithmetic level. Children who enter kindergarten with lower or average initial arithmetic achievement seem to profit (in terms of higher levels of arithmetic achievement) from a stimulating teacher, while children with high initial arithmetic achievement seem to have no significant benefit from a teacher's stimulating style.

Many previous studies among elementary school children or older students evidenced that an *autonomy-supportive teacher style* positively influences children's school adjustment (for a review, see Reeve, 2006). In contrast to our hypothesis, our results failed to replicate these outcomes and we even found that an autonomy-supportive teacher style was negatively related to school enjoyment, negatively related to language achievement among children with low initial language achievement and negatively related to arithmetic achievement

among children with low or average initial language achievement. In contrast to older children, kindergartners seem to suffer detriment from a teacher that encourages their self-determined activity and avoids using controlling language. How can we explain these results? Perhaps, an autonomy-supportive teacher style is associated with poorer instructional structure or clarity and some kindergartners cannot cope with such an open environment. Especially children who enter kindergarten with fewer language skills and a poorer vocabulary might be less able to express themselves or understand what their teacher is saying. It is possible that in classrooms in which teachers focus on children's expression of interests, opinions, etcetera (i.e., an autonomy-supportive teacher style) the initially less eloquent children will be less involved, and eventually perform lower on language and arithmetic tests.

The final aspect of the teacher's interpersonal style, *emotional support,* failed to predict any child outcome. This is in contrast with our expectation and with previous research in which teachers' emotional support positively affects children's socio-emotional or motivational functioning and achievement (e.g., Connor, 2010; Hamre & Pianta, 2005; NICHD ECCRN, 2002). Also, these results did not replicate previous studies that found a compensatory role of a teacher's emotional support (e.g., Hamre & Pianta, 2005). A teacher's emotional support could not moderate the influence of children's SES or initial achievement on school adjustment. One possible explanation for the fact that we failed to replicate the previous studies is that the relatively high mean and the low standard deviation of this scale might point to a ceiling effect, and this low observed variability between teachers could mask some findings.

6.2. INSTRUCTIONAL ACTIVITIES

In contrast to previous studies among older children (e.g., Cordova & Lepper, 1996) and to our expectations, the amount of *interest-based activities and materials* was (slightly) negatively associated with language achievement. However, because this result was not very robust, it must be interpreted with caution. No association was found with other child outcomes, and no moderation effect of SES or initial achievement could be found. Perhaps because children in this study were very young, their developing interests might not be very

determinative for whether they will engage in a certain learning activity. It is possible that at this young age, other factors such as attractiveness, novelty, the introduction, the options, etcetera are more determinative to whether children become motivated toward a certain learning activity.

Providing *time for limited-choice activities* in class is generally seen as an effective way to support children's need for autonomy, and it has been suggested that offering choices will improve motivation and achievement (Ryan & Deci, 2000), but that the number of choice options may not be to large (Katz & Assor, 2007; Pattall et al., 2008). Therefore, we hypothesized that only the amount of time spent on limited-choice would be related to optimal school adjustment. Contrary to our predictions, we found that the amount of time for limited-choice (max. 4 choice options) was negatively associated with children's arithmetic achievement at the end of kindergarten. This means that the more time is spent on limited-choice activities, the lower the arithmetic achievement of children at the end of kindergarten. One could argue that for kindergartners, in contrast to older children, offering a lot of time for limited-choice activities is cognitively too demanding resulting in lower arithmetic scores, but then the question arises why the amount of time for free-choice activities isn't more negatively associated with arithmetic achievement. Perhaps, because the amount of time for limited-choice activities was negatively related to the amount of free-choice time, they reflect not only a quantitatively different classroom approach, but also a qualitatively different one. In line with our hypothesis, providing a lot of time for limited-choice activities in classroom was found to be positively related to children's level of independent participation in classroom. Because this effect is not robust it must be interpreted with caution. The amount of free-choice activities was only positively related to independent participation among children with average or high initial language achievement. We found a moderation effect of initial arithmetic achievement and not of SES, as had been suggested by previous studies (Snibbe & Markus, 2005). Perhaps children who have trouble processing complex information (and have a lower initial arithmetic achievement) could be less at ease in an open environment with a lot of free-choice time and more complex rules compared to their peers with higher initial arithmetic achievement.

6.3. LIMITATIONS

Six limitations require to be mentioned. First, although the results were controlled by including a number of important child covariates such as gender, age, SES and initial achievement, the correlational nature of the data does not allow for any causal inferences. Other instructional variables (e.g., offering structure, spending time on reading and arithmetic instruction) that were not included in the study, could perhaps help to explain the results obtained. Second, most predictor variables were positively correlated with one another. Although the Variance Inflation Factors (which were all <2.5) indicate no risk for multicollinearity, the intercorrelations might to some extend have affected the results. This problem was partially avoided by the fact that parsimonious model building techniques were used when testing interactions. Third, in this study, a lot of time spent on choice time (limited or free choice) affects arithmetic achievement and independent participation, but this does not imply that a small amount of time spent on choice time will have the same effect (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008). Fourth, teacher ratings of children's school enjoyment or independent participation do not necessarily reflect children's true school enjoyment or independent participation. Teacher ratings may be biased by social desirability or the inability to perceive or observe children's functioning. Moreover, it might be true that the teacher's ability to observe and rate their students' functioning might be associated with a certain teaching style or certain teaching activities. Another problem with teacher ratings relates to the fact that these ratings were conducted about one month before the observations took place. The present approach only makes sense if it is assumed that stable aspects of both the children and the teachers were measured. Fifth, although the scales and items used in this study reflect some major concepts within the area of school psychology, the scales have not extensively been used yet in other research, making the connection to other studies less transparent. Another problem with the observation instruments was already reported; the day-to-day stability of the measures indicating time devoted to choice activities was low. Future research that incorporates well-established instruments might shed more light on the generalizability of the present findings. Sixth, because we used a stepwise procedure in testing moderation effects, the results should be cross-validated in a new dataset in future research.

6.4. IMPLICATIONS

Since the topic of autonomy support is becoming more and more popular within the educational literature as well as within educational practice, Flemish kindergarten teachers are stimulated to focus on providing experiential practices in their classroom. Flemish teachers are stimulated to create time for (limited) choice activities, involve their students when decisions need to be made, try to motivate children without using controlling language, etcetera. This study examined these different practices and fails to provide evidence that all experiential practices favour children's school adjustment in terms of school enjoyment, independence, and their language and arithmetic achievement. First, this study suggests that a distinction must be made between several experiential practices. A stimulating teacher style was generally associated with higher school achievement, while other experiential practices (autonomy support and the amount of time for limited-choice activities) were generally associated with lower school achievement. These differences perhaps reflect the differences in the literature regarding the effects of child-centred education practices; some practices might be more beneficial than others. Perhaps, this difference could be explained by the amount of teacher guidance. A stimulating teacher style requires direct teacher guidance, whereas guidance is less crucial for an autonomy-supportive teacher style and for providing choice time. Teacher-guided instruction has been proven to be effective for school achievement, while non-guided instruction has been found to be less effective, or sometimes even detrimental for school achievement (Kirschner, Sweller, & Clark, 2006; Mayer, 2004; Morrison & Connor, 2002). The most effective education is instruction that embeds structured and guided into activities that are meaningful and fun for young children (Stipek, 2006). Especially kindergartners might be prone to the effects of unguided versus guided instruction (Alfieri, Brooks, Adrich, & Tenenbaum, 2011). Perhaps, the unguided aspects of autonomy-support might not be developmentally appropriate for kindergartners, in contrast to older children.

Second, this study suggests that students might differentially respond to experiential practices according to certain student characteristics such as initial achievement. Children with initially low arithmetic scores especially take advantage, in terms of later arithmetic achievement, of having a teacher who stimulates them to think and act, and who does not spend much time on free-choice activities, compared to children with higher initial

arithmetic scores. Surprisingly, teachers who adopt an autonomy-supportive, non-controlling style risk that their less eloquent pupils achieve worse than when they had adopted a more controlling teacher style. It seems that this practice could create larger inequality between high and low initial achievers, and thus provoke a Matthew effect (e.g., Walberg & Tsai, 1983). This effect might be reflected in previous studies on child-centred education that evidenced that it is especially detrimental for initial low achievers (Connor & Morrison, 2002; Connor, Morrison & Petrella, 2004). Perhaps, the unguided nature of this teacher style is especially detrimental for initially low achievers, while more teacher-guided experiential practices (e.g. stimulation) benefited less able learners (Kirschner, Sweller, & Clark, 2006; Kyllonen & Lajorie, 2003). This 'appropriate fit' between teacher guidance and needed guidance has been found to be an important indicator for school adjustment (Trawick-Smith & Dziurgot, 2011).

Does this study suggest that autonomy is not a universal psychological need among kindergartners, as postulated by self-determination theory (Deci & Ryan, 2000) and evidenced by a wealth (e.g., Shih, 2008) of studies? No. Should teachers stop trying to focus on autonomy support? No. The way in which children experience their classroom environment is not necessarily in accordance with the observed classroom environment. They can experience it in different ways, and this experience is unique for each child. For example, some people prefer to have choices, while for others having choices is less crucial to satisfy their need for autonomy (Snibbe & Markus, 2005). Therefore, this study suggests that teachers and school psychologists should not be guided by the idea that experiential practices will necessarily improve the school adjustment of all children. In contrast, we argue that teachers and school psychologists should be stimulated to focus on the experience of children and the identification of their needs and let this 'experience-based approach' (Laevers & Heylen, 2003; Stipek, 2006), instead of a mere focus on experiential practices, be their guidance on how to nurture the need for autonomy of kindergartners. These results also highlight the importance of differentiation in the kindergarten classroom. Differentiation requires teachers to proactively modify teaching strategies, methods, and activities in order to address the diverse needs of their students. Future research is needed to shed more light on how teachers can support autonomy for a diversity of children.

3

Academic achievement in alternative schools

Manuscript submitted as:

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ABSTRACT

The present study examines longitudinal data of 6146 children from 120 traditional primary schools and 32 alternative (e.g. Freinet, Steiner/Waldorf) schools in Flanders. Hierarchical quadratic growth curves examined children's learning gains (in mathematics, reading fluency, spelling and reading comprehension) from first to sixth grade, taking into account differences between schools in student population. This study further examined differential effects of children's early language skills. Results indicated that alternative schools are less effective than traditional schools in teaching mathematics. This effect was the largest for children with high language skills. Alternative education did not affect the learning gains in spelling, reading fluency or reading comprehension. However, initially (at the end of first grade) children in alternative schools scored lower on the spelling and reading fluency tests compared to children in traditional schools. This effect on spelling was larger for children with poor language skills.

Keywords: alternative education, growth curve models, multilevel models, educational effectiveness, differential effects

1. INTRODUCTION

In many countries, parents may decide to enrol their child in a school with an alternative pedagogical view and method (e.g. the Freinet approach, the Steiner/Waldorf approach). The premise of alternative schools is that the child, not knowledge, has to be at the centre of education. Although traditional education nowadays has incorporated a lot of ideas and techniques inspired by alternative education, alternative education does differ significantly from traditional education in several ways. In alternative schools teachers consider the learning process as a process of self-development, in contrast to teachers in traditional schools, who value the child-centred approach less (Verhaeghe & Gadeyne, 2004). Observation studies (Van Heddegem, Laevers, & Van Damme, 2004) indicated that teachers in alternative schools adopt a more autonomy-supportive teacher style, devote more time to choice-activities (e.g., centre work), and offer more freedom within these choice activities (e.g., more choice options, less rules). Further, teachers in alternative schools consider the basic skills (such as reading, spelling and mathematics) less as the only important educational goals than do teachers in traditional schools (Verhaeghe & Gadeyne, 2004). Teachers in alternative schools also value the classical instructional strategies less than their colleagues in traditional schools. They make less use of pre-existing handbooks and materials and make less use of drill and practice as an instructional strategy. Alternative schools use more experiential practices as centre work and multi-age classes than traditional schools (Verhaeghe & Gadeyne, 2004).

Although the effects of specific alternative practices has been the focus of a wealth of studies (e.g., Dochy, Segers, Van den Bossche, & Gijbels, 2003; Hugener et al., 2009; Nie, & Lau, 2010), the effect of alternative schools on achievement has seldom been the object of research. In this study, the effects of alternative education will be compared to the effects of traditional education in terms of school achievement (mathematics, reading fluency, spelling and reading comprehension). A distinction will be made between average or main effects, and differential effects (Scheerens & Bosker, 1997). Main effects focus on the contribution of the school to e.g. the achievement level of the children whereby differences in background and intake characteristics are taken into account. Differential effects concern the contribution of a school to e.g. the achievement level of specific groups of children (Campbell, Kyriakides, Muijs, & Robinson, 2004). While some schools reinforce prior existing

differences in school achievement, other schools might have a compensatory effect (Sammons, Nuttall, & Cutance, 1993).

2. PREVIOUS STUDIES ON THE EFFECTS OF ALTERNATIVE EDUCATION

2.1. MAIN EFFECTS

Only few studies examined the effects of alternative education. Most studies have mainly focused on the effects of Steiner/Waldorf schools (according to the ideas of Rudolf Steiner), a specific type of alternative education. We limit our literature review to quantitative studies incorporating at least 30 children and making adjustments for the differences in student population. Cunningham and Carroll (2011) matched first-grade children from two Steiner/Waldorf schools to first-grade children from a traditional school on initial reading ability and home literacy environment. The children in traditional schools, who were on average younger than Steiner/Waldorf-educated children, outperformed their peers in Steiner/Waldorf schools on spelling. No difference was found in reading fluency or reading comprehension. Among ninth-grade secondary students, Steenbergen (2009) found that there was no difference in students' achievement on a Dutch language test after correction for student background characteristics (gender, IQ, socio-economic status, and other family characteristics). Further, students from Steiner/Waldorf schools scored lower on mathematics tests in seventh and ninth grade, but no difference in learning gain was found (Steenbergen, 2009).

In Flanders (the Dutch speaking part of Belgium), previous research has documented the early development of children in alternative schools. At the beginning of kindergarten (the third grade of preschool), children in alternative schools performed better on preparatory language and mathematics tests compared to children in traditional schools after correction for educational level of the mother, language spoken at home and age (Verhaeghe & Gadeyne, 2004). There were no differences in language or mathematics learning gain during kindergarten (Verhaeghe & Van Damme, 2004). At the beginning of first grade, children in alternative schools performed better on language and mathematics tests than their peers in

traditional schools. However, at the end of first grade, children in alternative schools had a significant lag in reading fluency, spelling, and mathematics (Verhaeghe & Van Damme, 2005). The general tendency is that, in the first years of primary education the learning gain of children in alternative schools is smaller compared to the learning gain in traditional schools, but by the end of primary education (Grades 5 and 6) their learning gain is larger (de Bilde, Verhaeghe, Knipprath, Mertens, & Van Damme, 2011).

2.2. DIFFERENTIAL EFFECTS

The early founders of alternative education (e.g. Célestin Freinet, Rudolf Steiner, Maria Montessori, Helen Parkhust, Peter Petersen) were particularly concerned with the future of disadvantaged children. They created alternative schools with the particular goal to educate children from underprivileged backgrounds, such as children from farmers, factory workers, or children with disabilities. Nowadays, almost one century later, the (target) audience of alternative schools has dramatically changed. In some cases, alternative schools have become schools for the elite. Recent data from a representative sample of Flemish alternative schools suggested that alternative schools attract an advantaged population (Verhaeghe & Van Damme, 2005). In alternative schools there are more children from families with a high Socio-Economic Status (SES) compared to traditional schools. In addition, children in alternative schools have on average higher initial scores in language and mathematics, compared to their peers in traditional schools (Verhaeghe & Van Damme, 2005). This contrast between the present and the past leads us to the question which children profit most from alternative education.

In the present study, we use language skills to indicate which children are at risk of later school problems. Children who already fall behind in terms of speaking or listening skills, might not be poised to understand and learn from language or mathematics instruction, and therefore might not be able to take advantage of learning opportunities leading to later reading, spelling and mathematics difficulties (Smart, Prior, Sanson, & Oberklaid, 2001). Steenbergen (2009) examined differential effects with regard to initial achievement among students in secondary Steiner/Waldorf schools. She did not find differential effects.

3. RESEARCH QUESTIONS

In the current study, we examine the effects of alternative education on four student outcomes: mathematics, reading fluency, spelling and reading comprehension. Because of the small number of previous studies in this field, we will not propose any hypotheses. Following the distinction between main and differential effects in educational effectiveness research, we propose two research questions. First, we aim to examine the main effect of alternative education on student's achievement. To this end, we control for relevant child characteristics. Second, we will examine differential effects with regard to language skills. We will study whether alternative education a) improves the achievement of children with poor language skills and plays a compensatory role, b) is more beneficial for the children with high language skills, or c) is equally effective for both types of children.

4. METHOD

4.1. PROCEDURE AND PARTICIPANTS

The study is based on data from the SiBO project (SiBO is the Dutch acronym for School Careers in Primary Education; Maes, Ghesquière, Onghena, & Van Damme, 2002). This is a longitudinal study in Flanders[2] (Belgium) following a cohort of children through their early school career. In the SiBO project, information is collected about the child, family, teacher, classroom, school and senior management. The present study consists of data regarding children in a representative sample of 120 Flemish schools (of which 2 are alternative schools), and an oversampling of 30 extra alternative schools.

[2]In Flanders, just like in most other countries, primary education comprises six years. Children generally go to first grade in the year in which they become six years old. From then on, education is compulsory. In Flanders, there are three main categories of schools, which all organize alternative education: public schools organized by the Flemish Community (publicly run), subsidized schools funded by local public authorities (publicly funded), and subsidized 'free' schools organized by a private organization (also publicly funded). All schools get basically the same support from the government for the teaching staff and the operational costs. All schools are obliged to reach the attainment targets set by the Flemish government.

In total data from 6146 children were included in the analysis. In first grade, 3982 children were enlisted in a participating traditional school, and 708 children were enlisted in a participating alternative school. The sample size decreases over time: in sixth grade, data from 3405 children in traditional schools and 511 children in alternative schools was used. The total sample both within traditional and alternative schools decreases due to student mobility and also some schools dropped out of the project.

4.2. INSTRUMENTS

4.2.1. ACADEMIC ACHIEVEMENT

Over the six years there were seven measurement occasions: the beginning and end of grade one, and at the end of grade two, three, four, five and six (for an overview, see Cortois, Van Droogenbroeck, Verachtert, & Van Damme, 2011). At the start of first grade, children were tested on their *language skills* (Verachtert, Ghesquière, Hendrikx, Maes & Van Damme, 2005). The test contained 40 items that tapped the children's listening skills, rhyming skill, auditory synthesis skills, orientation towards writing and passive letter knowledge.

Regarding school achievement, four achievement domains were tested: mathematics, spelling, reading fluency and reading comprehension. Not all achievement tests were administered at every measurement occasion. Within each achievement domain, there are several test versions which most optimally adjust to the achievement level of the children and avoid floor or ceiling effects. All test scores on the different versions were calibrated to form one skill scale using IRT analysis (see e.g., Thissen & Wainer, 2001). The *mathematics tests* were assessed at every measurement occasion (from the start of first grade to the end of sixth grade). The content of the test depends on the version (and the learning goals of the grade for which it is meant). For example the test at the start of first grade assesses children's ability to count, to compare quantities and their knowledge of concepts (bigger, wider, the middle). The test at the end of sixth grade assesses mental calculation, mathematics, problem-solving, measurements in applied settings, geometry, and ciphering. *Spelling tests* (SVS-V; Moelands & Rymenans, 2003a) were administered at the end of first, second, fourth and sixth grade. The tests contains about 40 words which were verbally introduced within sentences. *Reading fluency tests* ('three-minute test'; Moelands &

Rymenans, 2003b) were administered at the end of first, second, third and fifth grade. They assessed the number of words children can accurately read in three minutes. The *reading comprehension tests* (a shortened version of the original test; Staphorsius & Krom, 1998) were administered at the end of third, fourth, fifth and sixth grade. Tests contained short texts, followed by a number of multiple-choice questions regarding the text. Every test contained 35 to 50 questions.

4.2.2. HOME ENVIRONMENT

The parent questionnaire was administered once in school year 2002-2003, when children were in K3 (i.e. the third year in preschool), and in 2003-2004 for the remaining children. The parent questionnaire provided information about the family's *SES,* the language spoken at home, the family's cultural capital and the child's social environment. The SES variable was based on mother's and father's educational level, their professional status, and the family income (see Reynders, Nicaise, and Van Damme, 2005). The parent questionnaire also provided information about *the dominant language spoken at home*. A distinction was made between predominantly Dutch-speaking families and predominantly foreign-speaking families. Third, parents filled in two Likert type questionnaires on a six point scale varying from one (totally not applicable) to six (very applicable) providing information about the family's *cultural environment* (4 items, e.g., "In our family, we watch the TV news daily") and *social environment* (4 items, e.g., "We often go on family visit"; Reynders, Van Heddegem, Nicaise, & Van Damme, 2004).

4.2.3. INTELLIGENCE

In school year 2005-2006, when on-track children were in third grade, an intelligence test was conducted that assessed children's fluid intelligence; the standard progressive matrices (SPM; Raven, Raven, & Court, 2000). This is a non-verbal test with 60 items using meaningless figures. One has to find the missing figure from six or eight possibilities using inductive reasoning (Hendrikx, Maes, Ghesquière, & Van Damme, 2007).

Table 7. ***Descriptives of the study's major variables***

Variables	N	% Missing	Min.	Max.	Mean	SD
Covariates						
Gender	6122	0%	0.00	1.00	0.50	0.50
Birth Month	6120	0%	1.00	12.00	6.58	3.41
Birth Year	6120	0%	-3.00	2.00	-0.24	0.54
Language skills	4528	26%	22.48	70.01	53.62	7.67
Diagnosis	3941	36%	0.00	1.00	0.14	0.35
Fluid IQ	4425	27%	3.00	74.00	52.90	11.82
SES	4256	31%	-2.36	2.07	0.01	0.89
Dutch-speaking family	4515	27%	0.00	1.00	0.09	0.29
Cultural Environment	4194	32%	1.00	6.00	3.65	1.14
Social Environment	4213	31%	1.00	6.00	4.36	0.85
Dependent variables						
Mathematics BG1	4520	26%	26.07	74.25	55.81	8.29
Mathematics EG1	4503	27%	42.16	86.35	68.51	8.12
Mathematics EG2	4285	30%	52.15	101.16	81.03	8.18
Mathematics EG3	3965	35%	58.98	113.05	89.33	9.25
Mathematics EG4	3980	35%	65.80	116.68	96.66	8.56
Mathematics EG5	3964	36%	71.54	124.69	102.41	8.85
Mathematics EG6	4004	35%	81.05	130.57	106.96	8.28
Reading Fluency EG1	4406	28%	0.00	294.00	78.88	46.58
Reading Fluency EG2	4293	30%	1.00	338.00	159.83	55.96
Reading Fluency EG3	3885	37%	21.00	382.00	203.79	53.38
Reading Fluency EG5	3877	37%	42.00	420.00	258.37	49.75
Spelling EG 1	4404	28%	21.00	101.00	77.72	12.16
Spelling EG 2	4316	30%	42.00	127.00	92.59	10.96
Spelling EG 4	3968	35%	60.00	150.00	109.52	10.54
Spelling EG 6	3641	41%	74.00	157.00	126.81	9.12
Reading Comprehension EG3	3972	35%	21.38	63.81	42.57	7.65
Reading Comprehension EG4	3994	35%	26.20	68.82	49.40	7.58
Reading Comprehension EG5	3955	36%	32.97	74.34	53.79	7.29
Reading Comprehension EG6	4006	35%	36.50	81.09	59.37	7.77

Note. IQ = Intelligence Quotient, SES = Socio-economic status, B = Begin, E = End, G = Grade.

4.2.4. DIAGNOSIS

In school year 2008-2009 (when on-track children were in sixth grade) a questionnaire was administered by the school's care co-ordinator (or the teacher) who was asked which children had a certain diagnosis (Van Droogenbroeck, Ghesquière, Gadeyne, Vandenberghe, & Van Damme, 2011). Only the diagnoses of which a motivated report was written by a professional diagnostician were considered. A diagnosis can be related to learning (e.g. dyslexia), physical (e.g., chronic disease) or behavioural (e.g. oppositional defiant disorder) or emotional problems (e.g. depression). The three most common diagnoses were dyslexia, ADHD and dyscalculia.

4.3. DATA ANALYSIS

Table 7 displays the descriptives of all major study variables. The percentages of missing data varied between 0.40% and 41% (see Table 7). Missing covariates were imputed using EM in SPSS 19.0 in accordance with best practices (Graham, 2009; Widaman, 2006). The imputation model contained all child background characteristics, and also extra variables obtained from a parent questionnaire in 2006-2007 which was similar to the questionnaire administered in 2002-2003.

To take into account the multilevel structure of the data, hierarchical growth curve models (Snijders & Bosker, 1999) were estimated with three levels (measurements within children within schools). Using the MLwiN-software, the development of achievement was examined using quadratic growth curves. In the empty growth model, we modelled the development of school achievement using a quadratic function. The fixed part of the growth model consists of three parameters (intercept, slope and acceleration) and describes children's average development in achievement. The intercept indicates the average level at the first measurement occasion (mathematics: begin first grade, spelling and reading fluency: end of first grade, reading comprehension: end of third grade), the linear growth predictor (coded 0, 1, 2, 3, 4, 5 and 6) indicates the children's overall linear growth and the quadratic slope (coded 0, 1, 4, 9, 16, 25 and 36) indicates the curvature of the slope. Random coefficients of the intercept, the linear and the quadratic slopes were entered at the school and student level. Next, the student-level covariates were included to take into account differences

between schools in student intake characteristics when comparing alternative and traditional schools. All covariates (except gender, diagnosis and birth year) were grand mean centred.

In all primary analyses, the criteria for significance was narrowed to $\alpha = .01$ because of the large number of parameters in the models. To examine the first research question about the main effects of alternative education, the dummy variable 'alternative' was entered into the model, together with the interaction terms with time, providing information about the main effect of alternative education on student's achievement growth. At the last measurement occasion, the difference in achievement between traditional and alternative schools was examined. Using simple slopes (Aiken & West, 1991), the effect of alternative education on the achievement levels at the last measurement occasion (i.e., fifth or sixth grade) was also examined. To examine the differential effects of alternative education, cross-level interaction terms between a) language skills (measured at the start of first grade) b) one of the time variables and c) the dummy 'alternative' were entered, providing an answer to the question whether the impact of alternative education is different depending on children's language skills. Using simple slopes, the impact of alternative education was estimated for pupils who were one standard deviation below and one standard deviation above the grand mean of the language test.

5. RESULTS

5.1. PRELIMINARY ANALYSES

5.1.1. DIFFERENCES IN INTAKE CHARACTERISTICS

At the student level t-tests were run to examine the differences between traditional and alternative schools regarding this study's major covariates. Traditional and alternative schools do not differ in terms of gender distribution ($t = 0.37$, *ns*), average birth month ($t = -0.74$, *ns*), percentage of Dutch-speaking families ($t = -1.57$, *ns*), average fluid intelligence quotient ($t = -0.19$, *ns*), and average language skills ($t = 0.93$, *ns*). Alternative schools do have a larger population of children who are older ($Percentage_{Traditional} = 12.51\%$, $Percentage_{Alternative} = 22.03\%$, $t = 5.97$, $p < .001$), or have a diagnosis ($Percentage_{Traditional} =$

12.19%, $Percentage_{Alternative}$ = 16.71%, t = -2.32, p < .05). Further, children in alternative schools have a family background which is characterized by a higher average SES ($Mean_{Traditional}$ = 0.13, $Mean_{Alternative}$ = 0.29, t = -5.11, p < .001), a higher average cultural environment ($Mean_{Traditional}$ = 3.59, $Mean_{Alternative}$ = 4.01, t = -2.73, p < .01), but a lower average social environment ($Mean_{Traditional}$ = 4.38, $Mean_{Alternative}$ = 4.26, t = 3.24, p < .01). These differences illustrate that student background characteristics must be taken into account in order to make a 'fair' comparison between schools.

5.1.2. THE GROWTH MODEL

In the empty growth model, all growth predictors were significant at the p < .001 level. Further, the random coefficients indicate whether the slopes significantly vary at the school or student level. Intra-Class Correlations (ICC's) were calculated by dividing the school-level variance by the total variance. There is moderate to large variability at the school level with ICC's ranging between 11.15% and 30.28% for the intercept, between 19.82% and 96.34% for the linear slope and between 26.45% and 65.25% for the quadratic slope.

5.1.3. MODEL WITH CHILD-LEVEL COVARIATES

After the empty growth model was defined, all twelve covariates (gender, birth month, birth year, the interaction between birth month and birth year, diagnosis, language skills, language spoken at home, SES, fluid intelligence, cultural environment and social environment) were entered together with their interaction with the linear and quadratic slope. These interaction terms were entered to take into account the effect of the covariates on the achievement growth curves. In total 32 parameters were added to the model.

Table 8. ***Hierarchical quadratic growth models comparing alternative versus traditional schools in children's mathematics, reading fluency, spelling and reading comprehension growth.***

	Mathematics				Reading Fluency				Spelling				Reading Comprehension			
	Main Effects		Differential Effects		Main Effects		Differential Effects		Main Effects		Differential Effects		Main Effects		Differential Effects	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Intercept (I)	55.56 ***	0.21	55.56 ***	0.21	86.73 ***	1.48	86.61 ***	1.50	81.56 ***	0.46	81.53 ***	0.47	43.87 ***	0.20	43.87 ***	0.20
Linear (L)	13.30 ***	0.16	13.30 ***	0.16	84.01 ***	1.30	84.03 ***	1.30	12.58 ***	0.34	12.59 ***	0.34	5.85 ***	0.51	5.84 ***	0.51
Quadratic (Q)	-0.87 ***	0.03	-0.87 ***	0.03	-10.13 ***	0.27	-10.14 ***	0.27	-0.70 ***	0.06	-0.70 ***	0.06	-0.19	0.16	-0.19	0.16
Covariates[a]																
Language	0.49 ***	0.01	0.49 ***	0.01	2.08 ***	0.10	1.99 ***	0.11	0.57 ***	0.02	0.54 ***	0.02	0.26 ***	0.02	0.26 ***	0.02
Language.L	-0.10 ***	0.01	-0.09 ***	0.01	-0.56 ***	0.08	-0.55 ***	0.09	-0.08 ***	0.02	-0.07 ***	0.02	-0.02	0.02	-0.02	0.02
Language.Q	0.01 ***	0.00	0.01 ***	0.00	0.08 ***	0.02	0.08 ***	0.02	0.01 **	0.00	0.01	0.00	0.01	0.01	0.01	0.01
Main effects																
Alternative	0.78	0.44	0.76	0.44	-17.66 ***	3.25	-17.49 ***	3.29	-4.92 ***	1.06	-4.94 ***	1.07	-0.05	0.43	-0.06	0.43
Alternative.L	-2.54 ***	0.33	-2.48 ***	0.33	-1.29	2.98	-1.35	2.98	-0.78	0.80	-0.79	0.80	-0.41	0.49	-0.44	0.49
Alternative.Q	0.34 ***	0.05	0.33 ***	0.05	0.98	0.63	1.00	0.63	0.33 (*)	0.14	0.34 (*)	0.14	0.18	0.15	0.19	0.15
Differential effects																
Alternative.Language			0.01	0.03			0.63 (*)	0.25			0.23 ***	0.06			0.02	0.04
Alternative.Language.L			-0.06 **	0.02			-0.12	0.23			-0.10	0.05			0.03	0.05
Alternative.Language.Q			0.01 (*)	0.00			0.01	0.05			0.01	0.01			-0.01	0.01
Random Effects[a]																
Level 3: School																
Intercept	3.57	0.52	3.56	0.52	125.74	22.60	131.01	23.27	17.79	2.57	18.28	2.63	1.84	0.38	1.84	0.38
Linear	2.30	0.32	2.26	0.31	105.54	17.99	105.49	18.00	9.02	1.37	9.09	1.38	2.75	0.51	2.74	0.51
Quadratic	0.06	0.01	0.06	0.01	4.67	0.80	4.67	0.80	0.29	0.04	0.29	0.04	0.24	0.05	0.24	0.05
Level 2: Student																
Intercept	14.19	0.56	14.20	0.56	1432.26	38.51	1427.99	38.42	41.81	1.96	41.50	1.96	24.77	0.84	24.77	0.84
Linear	2.87	0.25	2.85	0.25	419.65	25.89	419.91	25.89	1.00	1.57	0.93	1.57	3.51	0.98	3.50	0.98
Quadratic	0.03	0.01	0.03	0.01	12.98	1.20	12.99	1.20	-0.24	0.05	-0.24	0.05	0.16	0.10	0.16	0.10

Level 1: Measurement																
error variance	14.30	0.17	14.30	0.17	314.32	7.89	314.32	7.89	41.12	1.02	41.11	1.02	10.13	0.25	10.13	0.25
DIC	174110		174098		146488		146482		103486		103469		84403		84401	

Note. * p < .05, ** p < .01, *** p < .001; all predictors except gender and Time were grand mean centred..

a. For reasons of clarity, covariates and random covariances are not displayed.

5.2. MAIN EFFECTS OF ALTERNATIVE EDUCATION: THE 'AVERAGE' STUDENT

The main effects of alternative education pertain to the effects for a girl, born in June 1997 in an average (in terms of social-cultural environment and SES) Dutch-speaking family, who has no diagnosis, an average language skills and an average fluid intelligence.

Regarding mathematics achievement, inclusion of the main effects drastically improved model fit ($\chi^2(3) = 2999$, $p < .001$). Table 8 illustrates that there are no initial differences (at the beginning of first grade) between traditional and alternative schools, but alternative education has an effect on the linear and quadratic slope. Children in alternative schools have a smaller linear learning growth but a larger quadratic rate compared to the development of children in traditional schools (see Table 8). At the end of grade six, children in alternative schools perform significantly worse (B = -2.52, SE = 0.62, p < .001) in mathematics. Compared to the average annual learning gain of alternative schools (X = 5.15) in grade six, one could say that children in alternative schools need at least an additional five month of education to be at the level of mathematics skills of children in traditional schools (if we assume that a school year comprises of 10 months).

Further, the inclusion of the main effects did significantly improve model fit of reading fluency ($\chi^2(3) = 35$, $p < .001$) and spelling ($\chi^2(3) = 43$, $p < .001$). Alternative education has a significant negative effect on the intercept (end of grade 1) of reading fluency and spelling, but no (or only marginally significant) effect was found on the linear or quadratic slope (see Table 8). Although a significant effect was found at the end of first grade, this difference has disappeared by the end of primary education, there was no significant differences anymore between traditional and alternative schools in reading fluency (B = 0.38, SE = 4.45, *ns*) and spelling (B = -0.58, SE = 0.75, *ns*).

There was no evidence that children in alternative schools perform different from their peers in traditional schools on reading comprehension. The model fit with main effects was not significantly better than the model without main effects ($\chi^2(3) = 2$, *ns*). Accordingly, no significant differences were found in terms of initial status, linear and quadratic slope (see Table 8). At the end of sixth grade children in alternative and traditional schools perform equally well on the reading comprehension test (B = 0.53, SE = 0.52, *ns*).

5.3. DIFFERENTIAL EFFECTS OF ALTERNATIVE EDUCATION: LANGUAGE SKILLS AS A MODERATOR

To examine the possible differential effects of alternative education, cross-level interaction terms between language skills, the time variables and the alternative school variable were added to the previous models. The final models are represented in Table 8. Regarding mathematics achievement, the addition of the differential effects significantly improved model fit (χ^2 (3) = 12, $p < .01$). One differential effect is significant above the $\alpha = .01$ level (see Table 8). The linear slope of language skills varied significantly between children in alternative compared to traditional schools. More specifically, children who are situated higher in terms of language skills have a significant smaller linear growth in mathematics achievement in alternative education. However, simple slopes analysis (see Figure 9) indicated that being in an alternative school has a negative impact on the linear slope of both children with low (B = -2.08, SE = 0.37, $p < .001$) and high (B = -2.86, SE = 0.35, $p < .001$) language skills. At the end of grade six, children with high language skills scored significantly lower in alternative schools (B = -2.92, SE = 0.67, $p < .001$). For children with lower language skills, (B = -1.84, SE = 0.74, $p < .05$), alternative education did not significantly (at the $\alpha = .01$ level) affect their mathematics achievement at the end of sixth grade.

Regarding reading fluency, inclusion of the differential effects did not improve model fit (χ^2 (3) = 6, *ns*). No profound (at the $\alpha = .01$ level) evidence for differential effects was found. Figure 10 displays the simple slopes of children who score relatively low and high on the initial language test. By the end of fifth grade, for both children with low and high language skills, their was no (at the $\alpha = .01$ level) effect of alternative education on children's reading fluency (B = -8.54, SE = 4.02, $p < .05$; B = -5.64, SE = 3.55, *ns*).

The inclusion of the differential effects significantly improved the model fit (χ^2 (3) = 17, $p < .01$) of spelling. We evidenced above (cfr. 6.2) that children in alternative schools score significantly lower on the spelling test at the end of first grade (the first measurement occasion). When estimating interaction effects, we found evidence that this difference differs according to children's language skills (see Table 8). Especially children with lower language skills at the beginning of first grade perform worse in alternative schools than children in traditional schools. However, in alternative schools both children with low and high language skills scored lower on the first grade spelling test (-1SD: B = -6.62, SE = 1.16, *p*

< .001; +1SD: B = -3.67, SE = 1.12, p < .01; see Figure 11). Children with low and high language skills do not differ significantly in terms of their linear or quadratic growth (at the α = .01 level). At the end of sixth grade, no differences between alternative and traditional schools were found among children with low (B = -0.35, SE = 0.89, *ns*) and high (B = -0.54, SE = 0.77, *ns*) language skills.

There was no evidence for differential effects in reading comprehension. Inclusion of differential effects did not improve the model fit (χ^2 (3) = 2, *ns*). Figure 12 displays the simple slopes of children who scored low and high on the language test. At the end of sixth grade, there was no effect of alternative education on reading comprehension among children with both low (B = 0.09, SE = 0.56, *ns*) and high (B = 0.62, SE = 0.42, *ns*) language skills.

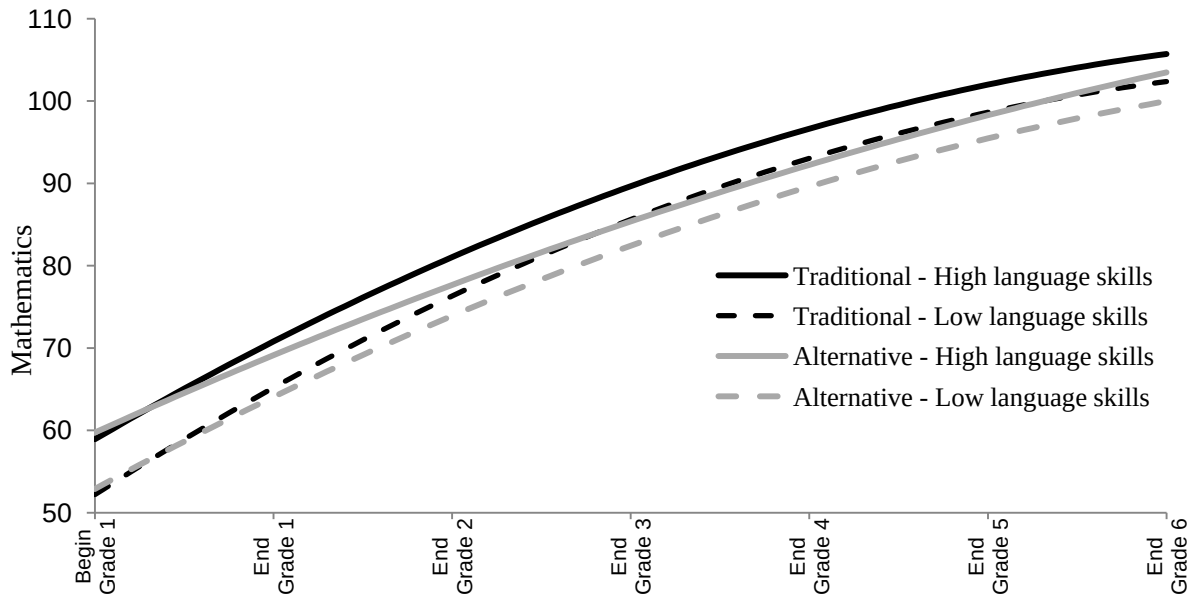

Figure 9. **Hierarchical quadratic growth curves in mathematics achievement of children with high (+1 SD above the grand mean) and low (-1 SD below the grand mean) language skills in alternative and traditional schools.**

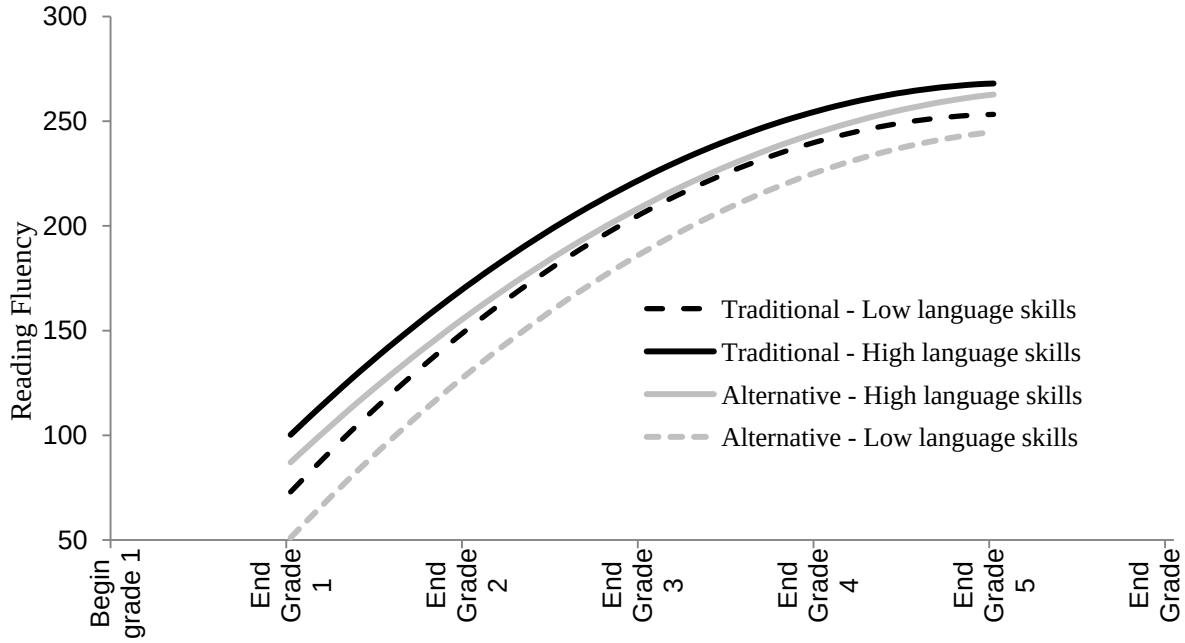

Figure 10. **Hierarchical quadratic growth curves in reading fluency of children with high (+1 SD above the grand mean) and low (-1 SD below the grand mean) language skills in alternative and traditional schools.**

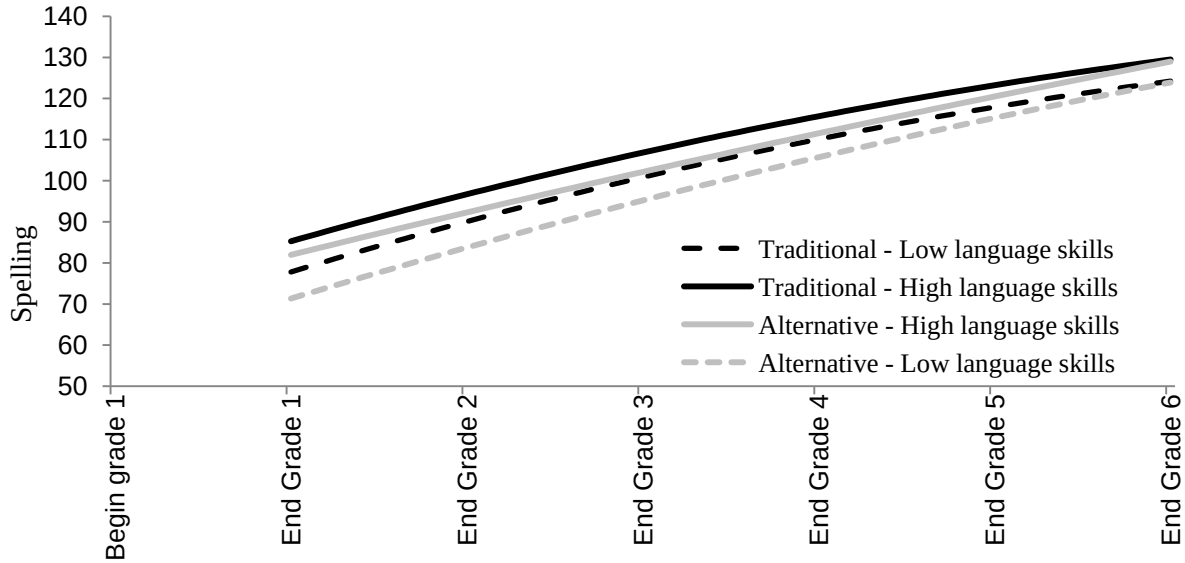

Figure 11. **Hierarchical quadratic growth curves in spelling achievement of children with high (+1 SD above the grand mean) and low (-1 SD below the grand mean) language skills in alternative and traditional schools.**

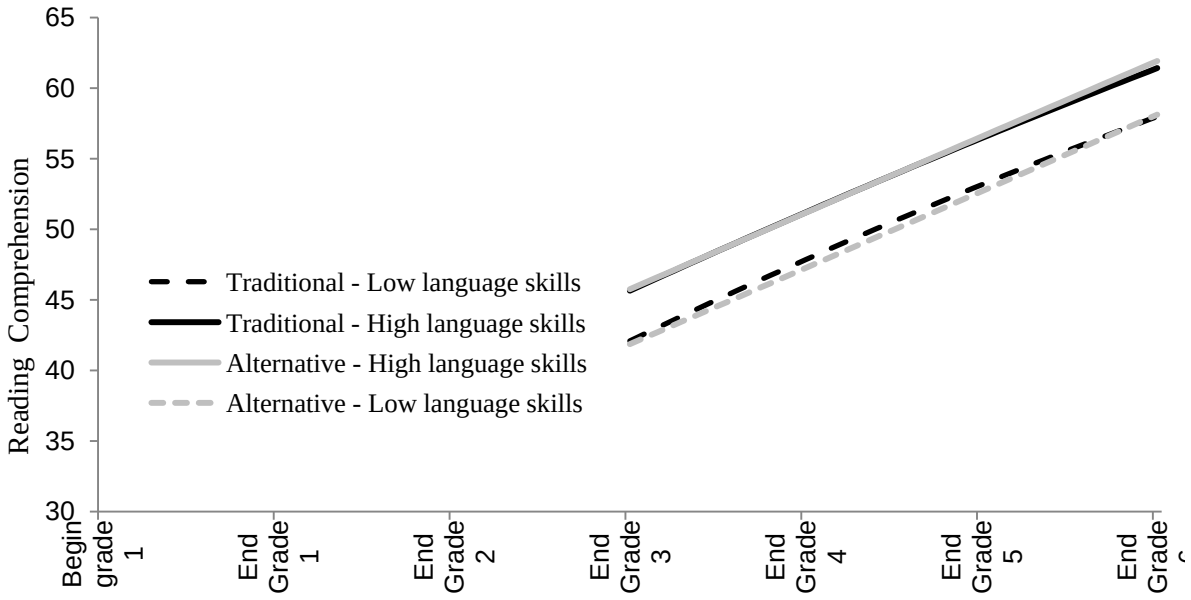

Figure 12. **Hierarchical quadratic growth curves in reading comprehension of children with high (+1 SD above the grand mean) and low (-1 SD below the grand mean) language skills in alternative and traditional schools.**

6. DISCUSSION

So far, only few studies have examined the question whether alternative schools can affect children's school achievement. This study aimed at examining the impact of a school's alternative versus traditional pedagogical approach on changes in children's achievement (mathematics, reading fluency, spelling and reading comprehension) in primary education. The first research question pertained to the main effects, the differences in achievement between alternative and traditional schools for the average student. The second research question regarded differential effects. More specifically, we examined whether alternative education has a differential effect depending on children's language skills.

6.1. EFFECTS OF ALTERNATIVE EDUCATION

The present study provided evidence that alternative education is less effective than traditional education in terms of teaching mathematics. At the beginning of first grade, no significant differences were found between the mathematics scores of children in alternative

and traditional schools. This result differs from that of the study of Verhaeghe and Van Damme (2005), who indicated that children in alternative schools scored significantly higher at the beginning of first grade. This difference is probably due to differences in data selection and method of analysis. Nevertheless, both studies indicated that alternative schools have a smaller learning gain in mathematics in the first year of primary education. Our results extended the results of Verhaeghe and Van Damme (2005) as we evidenced that this lag in mathematics achievement was even found at the end of primary education. This finding corroborates the study of Steenbergen (2009), who found that in first and third grade of secondary education, children in Steiner/Waldorf schools performed significantly worse on a mathematics test. Further, there were indications that the negative effect of alternative education is even stronger for children with high language skills. This means that alternative education decreases the gap between children with low and high language skills because especially the high language proficient children were learning less mathematics in alternative education.

Children in alternative schools performed significantly worse in reading fluency and spelling at the end of first grade (see also Verhaeghe & Van Damme, 2005). The difference in spelling in alternative schools is larger for children with lower language skills. Because we found an effect at our first measurement occasion (and not in learning gain or at the end of primary education), it is difficult to make strong conclusions about school type effects. The significant difference could be due to a) an insufficient control for differences between schools in student intake or b) the fact that the effect of alternative education had already taken place during first grade or even in kindergarten. Previous research supports the latter argument, as already during kindergarten and the first year an effect of alternative education on language achievement was found (Verhaeghe & Van Damme, 2004, 2005) and because the learning gain in alternative schools is typically a lot smaller in the early years of education (de Bilde, et al., 2011).

We have found no evidence that alternative education impacts children's reading comprehension. From third to sixth grade, a reading comprehension test was administered. On average, the development of reading comprehension of children in alternative schools does not differ from children in traditional schools. Carroll and Cunningham (2011) came to the same conclusion while examining reading comprehension scores at the end of the

second grade in Steiner/Waldorf and traditional schools. In addition, no evidence for differential effects was found.

6.2. LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Four limitations of the present study require mentioning. First, although we referred to the term 'effect', the correlational nature of the data does not allow for strong causal interpretations. Second, there was no initial measurement (start of first grade) of reading fluency, spelling and reading comprehension available. One cannot assume that there were no differences between alternative and traditional schools with regard to children's reading fluency, spelling and reading comprehension at the beginning of first grade. Entering prior measures in future research will shed more light on the question whether the found negative impact of alternative education on spelling and reading fluency is merely due to different intake characteristics or due to an early effect of alternative education in the first grade of primary education. Third, the sample of alternative education in the present study comprises several types of schools; Freinet schools, Steiner/Waldorf schools, Jenaplan schools, etc. The 32 alternative schools in this study form a rather heterogeneous group. The decision to study alternative schools as one group was based on the common democratic and child-centred pedagogy of all types of alternative schools. However, one could also argue that differences between school types could be found. Finally, apart from the variable alternative education, no other school or class level variables were entered. Perhaps the observed effects can be mediated by certain school or class level variables (e.g., heterogeneous grouping, classroom management, school culture). Inclusion of these variables might shed more light on the mediating role of other school, class or teacher characteristics.

6.3. IMPLICATIONS AND CONCLUSIONS

The present study is one of the first to reveal the challenge that alternative schools face to increase their children's mathematics achievement to a sufficient extent. In Flanders, both alternative and traditional schools have the obligation to reach certain attainment targets.

The used mathematics tests assess several topics that are included in the attainment targets of all schools, including the alternative schools. This indicates that these outcomes are also important among alternative schools. However, the achievement tests used in this study give an incomplete view on whether children reach the attainment targets. The attainment targets set by the Flemish government include a more elaborate set of targets, which also pertain to attitudes, knowledge transfer in other contexts, strategy use, etc. Future research incorporating a broader range of educational outcomes is necessary to get a more nuanced view of the effect of alternative education on mathematics.

Now should alternative schools abandon their alternative approach and adopt a more traditional approach in order to improve student's mathematics achievement? No, the challenge of school leaders and teachers in alternative schools is to find ways to improve children's mathematics achievement within the chosen alternative setting.

4

Early engagement in alternative schools

Manuscript accepted as:

de Bilde, J., Van Damme, J., Lamote, C., & De Fraine, B. (in press). Can alternative education increase children's early school engagement? A longitudinal study from kindergarten to third grade. Manuscript accepted for publication in *School effectiveness and school improvement.*

ABSTRACT

The current study examines the impact of alternative education on children's early school engagement in terms of school enjoyment and independent participation. A sample of 2,776 children from traditional (e.g. mainstream) and alternative (Freinet and Steiner/Waldorf) Flemish schools was followed from their third year of kindergarten until third grade. The present study does not evidence a positive effect of alternative education on school engagement. In contrast, it was found that in alternative education children acted less independent compared to traditional schools. Furthermore, differential effects in terms of children's socio-economic status and initial language achievement are explored. In alternative schools, children's initial level of language achievement tends to be less determinative for their school engagement compared to traditional schools.

Keywords: alternative education, Freinet, Waldorf, Steiner, school effectiveness, differential effects

1. INTRODUCTION

Throughout the world, there are a substantial number of schools that provide an alternative curriculum and/or pedagogical approach, and which explicitly present themselves as an alternative to mainstream or traditional education. While some alternative schools are inspired by philosophical, political or scholarly orientations, others are more ad-hoc assemblies of teachers who are dissatisfied with some aspect of traditional education. In Flanders (the Dutch speaking part of Belgium), these alternative school are gaining in popularity. For example, in Flemish public education, the number of children in alternative schools grew by 12% in two years (Jagers, 2009). Parents who send their children to alternative schools assume that these schools are characterised by a climate that supports children's inner motivational resources, like interests, self-determined strivings, psychological needs, resulting in increased school engagement compared to traditional schools.

Surprisingly, the effects of these alternative primary schools have seldom been the subject of research, and the research that does exist has methodological limitations or has revealed mixed results. In this study, the effects of alternative schools will be compared to the effects of traditional schools in terms of early school engagement. Moreover, the focus will be on exploring differential effects with regard to disadvantaged and advantaged children (in terms of socio-economic status and initial language achievement). We will examine whether alternative education has an impact on the gap between disadvantaged and advantaged children.

2. EARLY SCHOOL ENGAGEMENT

Although most studies in the field of educational effectiveness have focused on cognitive outcomes such as academic achievement in terms of basic skills in reading and mathematics, nowadays, motivational outcomes (such as school engagement), are also found to be important and are considered as educational objectives in their own right (van der Wal & Waslander, 2007). School engagement has been the subject of a growing amount of studies, because this school engagement is presumed to be malleable (Fredericks, Blumenfeld, &

Paris, 2004). School engagement is closely related to academic motivation (Skinner & Belmont, 1993), and it is associated with school achievement, even in the long run (Ladd & Dinella, 2009; Skinner, Wellborn, & Connell, 1990).

This paper focuses on two indicators of children's early school engagement: school enjoyment and independent participation. *School enjoyment* can be conceptualized as the emotional aspect of school engagement. It refers to a child's positive affective reactions to the classroom or the larger school context. It is seen as an essential characteristic of intrinsic motivation, associated with a wide variety of optimal learning outcomes, and has been found to decline across the school years (Wigfield, Eccles, & Rodriguez, 1998; Stoel, Peetsma, & Roeleveld, 2003). *Independent participation* can be considered as a more behavioural aspect of school engagement (Doumen, Koomen, Buyse, Wouters, & Verschueren, 2012) and pertains to children's tendency to take initiative, be self-determined and set their own goals. Developmental psychologists describe children's independent participation as important for later self-regulation and self-determination (Landry, Smith, Swank, & Miller-Loncar, 2000).

Educational effectiveness research studying of children's school engagement in the early years is uncommon (Stoel et al., 2003). This is probably due to the fact that these concepts are difficult to measure in young children. However, at the start of primary education, children already put more or less investment into school, show their enjoyment and have certain working habits, all of which can be observed by their teachers (Stoel et al., 2003). Another issue pertains to the small effect sizes. Many studies have found that school effects on non-cognitive outcomes like school engagement are much smaller compared to school effects on cognitive outcomes (Opdenakker & Van Damme, 2000; Van Damme et al., 2006) and can vary between 1% (Battistich, Solomon, Kim, Watson, & Schaps, 1995) and 6.5% (Opdenakker & Van Damme, 2000). This means that differences in school engagement are mostly situated at the pupil level. In other words, it is mainly the differences between pupils that explain the variance in school engagement (Van Landeghem, Van Damme, Opdenakker, De Fraine, & Onghena, 2002).

Although the size of the school effects on school engagement are generally small, studies have identified several factors at the school or teacher level that can influence children's school engagement (Fredericks, 2011). Teacher-student relationships characterized by high closeness and support and low conflict result in higher engagement of children (Doumen et

al., 2012; Hughes, Luo, Kwok, & Loyd, 2008). Teachers can also increase engagement by being involved, autonomy-supportive, and providing enough structure (Skinner & Belmont, 1993). Furthermore, engagement is likely to be higher when teachers offer tasks that have some connection to students' lives outside the classroom, consider children's opinions when making decisions, listen to their students and offer opportunities to develop their ideas (Fredericks, 2011). In sum, previous research suggests that a child-centred, experiential and cooperative classroom environment should buttress school engagement.

3. ALTERNATIVE EDUCATION IN FLANDERS

3.1. FLEMISH EARLY EDUCATION

From the age of 2.5, children can enter kindergarten, which in most schools consists of three subsequent 'grades'. The aim of kindergarten is to develop, in a playful way, children's cognitive skills, their capacity to express themselves and to communicate, their creativity and independence. Although there are no formal lessons or assessment, kindergarten teachers are obliged to focus on certain government-determined educational goals. Although kindergarten is not compulsory, more than 90% of all children attend the last year of kindergarten. Most kindergartens are attached to a particular primary school, and often share buildings or other facilities. Primary school generally starts in the year in which the child becomes six years old. Some schools offer special kindergarten and primary education for children with disabilities or other special needs. Besides the traditional kindergartens and primary schools, parents can decide to subscribe their child to a school with an alternative pedagogical view, an alternative school.

3.2. ALTERNATIVE PEDAGOGIES

In Flanders, the two most popular alternative schools are the Freinet schools and the Steiner/Waldorf schools. The Freinet and Steiner/Waldorf schools are also internationally well-known forms of alternative education as Freinet schools exist in France and some other western European countries, and Steiner/Waldorf schools are known around the globe

(Europe, USA, Australia, etc.). Both these schools have origins in the beginning of the 20th Century, when an international pedagogical reform movement was created which rebelled against the '*école caserne*', a 19th Century school that was very knowledge and teacher-centred. The early reformers (e.g. Montessori, Dalton, Parkhurst, Freinet, Steiner) stated that not knowledge, but the child had to be at the centre of education. They wanted to create a school in which children could learn naturally, feel free to choose, become more self-confident and enjoyed learning. Most early reformers were concerned with the future of disadvantaged children (e.g. children from lower social classes, children with disabilities) and wanted to create schools that supported their social promotion. Although all alternative schools support these basic ideas, at least implicitly, they all have their own conceptions, depending on their creator and the spirit of the age when they existed.

Freinet schools. Freinet schools are schools which are inspired by the ideas of Celestin Freinet (1896-1966), a French teacher. According to Freinet, "The teacher's role becomes that of a facilitator to ease both cooperative and individual learning" (Freinet (1979), as cited in Temple & Rodero, 1995, p.165). Freinet schools differ from traditional schools in a number of ways. First, teachers from Freinet schools put more emphasis on children's self-development in their learning process and are more attentive towards the experience of children (Gadeyne, 2004). Second, Freinet teachers are more focused towards development of children's social skills, social interaction and engagement within the democratic structure, (Gadeyne, 2004; van der Wissel, 1983). Finally, instruction in Freinet schools is not traditional, but rather experiential and interest-based. This 'natural method to learn' is used as much as possible to cover the learning content.

Steiner/Waldorf schools. Steiner/Waldorf schools are based on the ideas of Rudolf Steiner (1861-1925), who created the theory of 'anthroposophy'. Waldorf teachers strive for a balanced development of children's thoughts, emotions and will (Crum, 1983, Zwart, 2008). Waldorf teachers differ significantly from teachers in traditional schools. First, they put less emphasis on the development of reading, spelling and arithmetic, make less use of the traditional teaching approaches and try to teach formal lessons in an alternative, more holistic and artistic fashion (Gadeyne, 2004). Second, teachers from Steiner/Waldorf schools put significantly more emphasis on children's motivational, artistical and physical functioning than do teachers in traditional schools. Surprisingly, in contrast to teachers in traditional or

Freinet schools, Waldorf teachers scored lower on a scale measuring their attention to children's interests, experiences and feelings (Gadeyne, 2004). Finally, Steiner/Waldorf schools differ structurally from other alternative or traditional (Flemish) schools. Steiner/Waldorf schools are characterized by a late onset of formal teaching at the age of seven (Nicol, 2007), avoiding grade retention during primary education, and looping (i.e., children have the same teacher during their entire elementary education, Crum, 1983).

4. THE IMPACT OF ALTERNATIVE EDUCATION

Since alternative schools are believed to make more use of teaching approaches aimed at stimulating children's motivational development and school engagement (e.g. attention towards teacher-child relationships, child-centred teaching, experiential learning, cooperative learning), the question can be raised as to whether these schools can positively influence their children's school engagement. Before we describe the literature regarding the effects of alternative education, it is important to note that within school effectiveness research a distinction is made between gross school effects (without control for pupil intake characteristics) and net school effects (with control for pupil intake characteristics). The latter are usually smaller compared to the former (Scheerens & Bosker, 1997). Furthermore, schools may differ not only in their overall effectiveness, but also for different groups of pupils (e.g. advantaged versus disadvantaged pupils in terms of SES or ability). There are some indications that certain school characteristics might be more beneficial for either disadvantaged or advantaged students (e.g., Teddlie & Stringfield, 1993). However, there is much inconsistency with regard to the extent to which these differential effects exist in terms of non-cognitive outcomes (Campbell, Kyriakides, Muijs, & Robinson, 2004). To identify disadvantaged children, several criteria can be used. Some authors use a demographic risk factor such as socio-economic status (SES) or ethnic background, while others use functional risk factors such as early achievement problems, behavioural problems, emotional problems, etc. (Hamre & Pianta, 2005; Sammons, Nuttal, & Cutance, 1993). Our literature review focuses on the available literature concerning quantitative research on the impact of either Freinet or Steiner/Waldorf education. Because studies generally focus on one specific type of alternative school (e.g. Freinet school,

Steiner/Waldorf school) instead of alternative schools in general, we kept this distinction in our review.

Regarding the effect of Freinet education of children's school functioning, studies had serious methodological shortcomings (for example, only one school was examined), and will not be mentioned further. With regard to Steiner/Waldorf schools, two studies exist in which more than three Steiner/Waldorf schools are included. Previous Flemish research (Brutsaert, 1993) comparing gross differences in six-graders' well-being and school enjoyment between traditional and Steiner/Waldorf schools surprisingly revealed that children from Steiner/Waldorf schools scored significantly lower on school engagement, children in Steiner/Waldorf schools reported to be less positive about their school and less involved in their studies. Further, children from Steiner/Waldorf schools reported having a lower self-concept (only boys), felt more isolated in their school, and had a more fatalistic orientation. These differences remained after taking into account the children's social background, the school size, the gender composition of the teacher team, and the children's attitude towards their teachers (Brutsaert, 1993). A study among ninth-grade secondary students in the Netherlands confirmed Brutsaert's (1993) findings, but also nuanced the negative image of Steiner/Waldorf schools. Students from Steiner/Waldorf schools had lower ratings on several scales related to their school functioning: extraversion, conscientiousness, and emotional stability (Steenbergen, 2009). However, they also reported higher levels of openness to experiences, a higher academic (in contrast to a general, see Brutsaert, 1993) self-concept, better relationships with their teachers, and they reported using more optimal learning strategies than students from traditional schools. These effects generally were reduced but remained significant after control for the student characteristics of gender, intelligence, SES, and the initial level of the dependent variable.

Steenbergen (2009) further focused on the differential effects of Steiner/Waldorf schools for different groups of students (based on student characteristics, intelligence, SES, and the children's previous level of functioning). With regard to the students' previous level of functioning, intelligence and SES, it was generally found that the gap between disadvantaged and advantaged students in terms of their motivational functioning was larger in Steiner/Waldorf schools compared to traditional schools. In other words, this study indicated that traditional schools were more effective than Steiner/Waldorf schools in narrowing the

gap between disadvantaged and advantaged students. However, there was one exception; in Steiner/Waldorf schools the academic self-concept was less defined by the children's intelligence quotient. Smarter students had, on average, less optimal self-concept than their peers who scored lower on the intelligence test.

5. RESEARCH OBJECTIVES

Alternative schools put more emphasis on various aspects of children's school engagement. The question can be raised whether alternative schools can positively affect children's school engagement compared to more traditional schools. This study examines the impact of alternative education on children's early school enjoyment and independent participation between kindergarten and third grade of primary education. We consider the difference between traditional and alternative schools, taking Freinet and Steiner/Waldorf schools as one group.

The first research question pertains to the 'gross' (i.e. uncontrolled) differences between alternative and traditional schools in terms of children's development of school engagement. Secondly, because alternative schools generally differ from traditional schools with regard to pupil intake characteristics, we will compare these schools after taking these characteristics into account. This research question pertains to the 'net' (i.e. controlled) differences in motivational growth between alternative and traditional schools. We control for gender, age, SES, initial language achievement and initial arithmetic achievement. The third main question regards differential effects for disadvantaged and advantaged children. More specifically, we examine whether a school's alternative versus traditional pedagogical approach has a different effect for children with low SES or a low initial language achievement compared to their more advantaged peers. Because of the lack of consistency between hypotheses derived from theoretical arguments (i.e., alternative schools apply more engagement-enhancing classroom practices) and hypotheses derived from the results of previous research (which would expect a rather negative impact of alternative education on school engagement), no a priori hypotheses were formulated.

6. DATA AND METHOD

6.1. PARTICIPANTS AND PROCEDURE

The study is based on data from the SiBO project (Maes, Ghesquière, Onghena, & Van Damme, 2002). This is a longitudinal study in Flanders (Belgium) involving a cohort of about 6,000 children followed through primary school. Information is collected about the child, family, teacher, classroom, school and senior management. In the present study, children were selected according to several criteria. First, all children who stayed in the same school for a period of four years (kindergarten, first grade, second grade and third grade) were selected. Only schools that could be clearly classified as being traditional, Steiner/Waldorf or Freinet according to the principal concerned, were retained (excluding 636 children from the analysis). Furthermore, children repeating a grade were also excluded from further analysis. Four years after the start of the data collection, when most pupils were in third grade, 16% of the children of traditional and Freinet schools had repeated at least one year. So, 44 children from Freinet schools and from traditional schools were excluded from further analysis. However, Steiner/Waldorf schools have a different school structure than traditional and Freinet schools. As formal education generally starts at age 7 in Steiner/Waldorf schools, Steiner/Waldorf schools only send the oldest children, who were born at the beginning of the year, to first grade. Eighty percent of all children born in the first half of the year were promoted to the first grade, compared to only 52% of all the children born in the second half of the year. Because of these structural differences in terms of the transition between kindergarten and first grade, the exclusion rate among Steiner/Waldorf schools was much higher, 35%, so 22 children from Steiner/Waldorf schools were further excluded from the analysis. The final data set contains 2,776 children (1,397 boys), 2,513 children from traditional schools (90.5%), 222 children from 19 Freinet schools (8%), and 41 children from 4 Steiner/Waldorf schools (1.5%). In April of their kindergarten year, their average age was 70 months with a standard deviation of 3.6 (some children skipped a year, or were already retained). This selected sample differed significantly from the original sample on a number of factors. The selected sample of children in traditional schools was significantly more advantaged compared to the original total sample with regard to children's SES ($F(1, 6017) = 29.04$, $p < .001$), and initial language achievement ($F(1, 6280) = 93.75$, $p < .001$). The selected

group of children in Freinet schools scored higher on SES ($F(1, 460) = 7.03$, $p < .001$), initial language achievement ($F(1, 465) = 7.029$, $p < .001$) and initial arithmetic achievement ($F(1, 465) = 8.89$, $p < .001$). With regard to Steiner/Waldorf schools, there were no significant differences between the total and the selected sample, probably due to the small sample size.

6.2. INSTRUMENTS

School enjoyment and independent participation. In each of the four measurement years (in February), the teachers rated their pupils' school enjoyment and independent participation on a 6-point Likert scale, with values ranging from 1 (*totally not applicable*) to 6 (*very applicable*). Four items tapped school enjoyment (e.g. 'This child does not like school' (reversed score), Cronbach's α varied between .82 (kindergarten) and .88 (third grade)). To measure independent participation, a shortened and translated version of the scale 'independent participation' from the 'Teacher Rating Scale of School Adjustment' (Birch & Ladd, 1997; Cornelissen & Verschueren, 2002) was used. Four items tapped independent participation in class (e.g. 'This child is self-determined and sets its own goals'), Cronbach's α varied between .81 (kindergarten) and .88 (third grade).

SES. When children were in kindergarten, a questionnaire was sent to the parents (non-responding parents received the questionnaire again the next year, in grade 1). The questionnaire contained questions about the family's social, cultural and economic characteristics. The construction of the SES variable was based on five components from this questionnaire: the educational level of the mother and the father, the mother's and father's professional status, and the family income. As a first step, the mother's and father's educational level were averaged and then their professional status was also. The three remaining scores were again averaged to calculate the SES variable. This SES variable was then standardized (Reynders, Nicaise, & Van Damme, 2005).

Table 9.*Psychometric Properties and Correlations of the Variables (based on the selected sample)*

Variables	Min.	Max.	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender	0	1	0.50	0.50	/													
2. Age	53	87	69.92	3.64	.02	/												
3. SES	-2.19	2.07	0.13	0.85	.03	-0.08***	/											
4. ILA	14.77	69.56	47.29	9.20	-.09***	.18***	.31***	/										
5. Initial Arithmetic Ach.	17.98	61.44	45.86	8.40	-.00	.04*	.38***	.71***	/									
6. Enjoyment Time 1	1.00	6.00	5.06	0.70	-.16***	.08***	0.06**	.22***	.20***	/								
7. Independence Time 1	1.00	6.00	4.21	1.01	-.12***	.18***	0.24***	.44***	.46***	.48***	/							
8. Enjoyment Time 2	1.50	6.00	5.00	0.70	-.14***	.06**	.12***	.19***	.18***	.20***	.23****	/						
9. Independence Time 2	1.00	6.00	3.99	1.02	-.02	.08***	.25***	.42***	.47***	.21***	.43***	.42***	/					
10. Enjoyment Time 3	1.00	6.00	4.90	0.75	-.14***	.03	.13***	.20***	.15***	.18***	.17***	..29***	.25***	/				
11. Independence Time 3	1.00	6.00	3.91	1.11	.04*	.08***	.24***	.40***	.44***	.18***	.41***	.27***	.60***	.40***	/			
12 Enjoyment Time 4	1.00	6.00	4.05	0.57	-.11***	.01	.11***	.13***	.12***	.15***	.17***	.20***	.25***	.29***	.25***	/		
13. Independence Time 4	1.00	6.00	4.01	1.11	.01	.05***	.25***	.40***	.43***	.19***	.42***	.27***	.54***	.26***	.61***	.42***	/	
14. Freinet	0	1	0.08	0.27	-.02	-.04*	.17***	.12***	.14***	.10***	.04*	.03	.09***	.09***	.06***	.03	.01	/
15. Steiner/Waldorf	0	1	0.02	0.12	.02	.21***	.05**	.10***	.10***	-.02	.01	.00	-.01	.01	.00	-.03	.00	-0.04

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. ILA =Initial language achievement, SES = Socio Economic Status.

Language and arithmetic achievement tests. When children entered kindergarten (September-October), their initial language and arithmetic skills were assessed (see Verachtert, 2003). Both tests contained 40 items. The language test was a shortened version of the original test (van Kuyk, 2003) and contained items that tapped the children's listening skills, rhyming skills, auditory synthesis skills, auditory memory skills and orientation towards writing. The arithmetic skills test (Verachtert & Dudal, 2004) contained items that tapped children's counting skills, comparison skills (comparing entities), and their understanding of space and time vocabulary. Internal consistencies were sufficient, with Cronbach's alpha ranging from .86 (language test) to .93 (arithmetic test) and factor analyses confirmed the unidimensional structure of both the language and arithmetic achievement test.

6.3. METHOD

In all analyses, we used a three level (schools-pupils-measurements) growth curve analysis with MLwiN. Sources of missing data were analysed and handled in accordance with best practices (Graham, 2009; Widaman, 2006). Proportions of missing data per scale were low (<5%). Little's MCAR test indicated that missingness was not completely random (χ^2 (3123) = 5167, $p < .001$). Single level imputation using the Expectation Maximization algorithm in SPPS 16.0 was used. Four series of analyses examining four research questions were executed. First, we modelled the development of school enjoyment and independent participation using quadratic functions (Model 1. For a similar approach see De Fraine, Van Landeghem, Van Damme, & Onghena, 2005). Second, to examine the gross differences (Model 2) between alternative and traditional schools, the alternative method was entered into the model, together with the interaction terms with time, providing information about the gross effect of alternative education on the growth in school enjoyment and independent participation. Third, the pupil-level variables age, gender, SES, initial language and initial arithmetic achievement were entered, to take into account differences between schools in pupil intake characteristics when comparing alternative and traditional schools (Model 3, net school effects). All covariates (except gender) were grand mean centred. The approach was similar to the approach examining gross differences. Fourth, interaction terms with SES and initial language achievement were entered, providing an answer to the question of whether

the impact of alternative education is different for advantaged and disadvantaged children. Using simple slopes (Aiken & West, 1991), the impact of alternative education on school enjoyment and independent participation was estimated for pupils who were one standard deviation below and one standard deviation above the grand mean (the mean of the total population).

7. RESULTS

7.1. PRELIMINARY ANALYSES

Differences in intake characteristics. Alternative schools tended to differ from traditional schools according to child characteristics (see Table 9). In general, children in alternative schools had higher initial language and arithmetic skills and had a higher SES. This was especially true for children from Freinet schools. Furthermore, children from Freinet schools were slightly younger than children from traditional schools, and children from Steiner/Waldorf schools were on average older, probably because of the structural differences in the transition to first grade.

The growth model. Models 1 in tables 10 and 11 contain the empty growth curve model. The fixed part of the growth model consists of a constant and two time predictors and describes children's average evolution in school enjoyment and independent participation. The constant indicates the average level in kindergarten, the linear growth predictor (Time, coded 0, 1, 2, and 3) indicates the children's overall linear growth and the quadratic slope (Time², coded 0, 1, 4, and 9) indicates the curvature of the slope. To construct the model, it was first tested whether the development of school enjoyment and independent participation could be described by a linear and/or quadratic slope. The model which included a quadratic slope significantly improved model fit compared to a model including only a linear slope with regard to independent participation, $\Delta\chi^2$ (1) = 72, $p < .001$. With regard to school enjoyment, including the quadratic slope deteriorated the model fit. However, because this coefficient was strongly significant (β = -.20, $p < .001$), it was decided to include it in the model. It was further tested whether the size of the slopes significantly varied at the school or pupil level. Adding random coefficients of both the linear and

quadratic slopes at both levels improved model fit (school enjoyment, $\Delta\chi^2$ (4) = 462, $p < .001$; independent participation, $\Delta\chi^2$ (4) = 115, $p < .001$).

The shape of the average curves describing the development of school enjoyment and independent participation are similar to the curves depicted in Figures 13 and 14. With regard to school enjoyment, the linear slope was significantly positive and the quadratic slope was significantly negative. This indicated that the initial positive linear slope was adjusted, and that the children's growth in school enjoyment tends to declining over time (see Model 1 in Table 10). With regard to independent participation, the linear slope was significantly negative, and the positive coefficient of the quadratic slope was small but significant (see Model 1 Table 11). This indicated a strong average decline in independent participation between kindergarten and Grade 3.

Inspection of the random effects showed that there is a substantial amount of variance situated at the measurement level, indicating deviations from the quadratic function, together with measurement inaccuracy. Secondly, at the pupil level the variances of the intercept, the linear and quadratic slope were remarkably small with regard to school enjoyment (17.64% of variation in intercept compared to 45.54% in independent functioning). At the school level, children's initial scores in school enjoyment and independent participation vary substantially, with Intra-Class Correlations (ICC's) of 17.64% (school enjoyment) and 8.91% (independent participation). ICC's were calculated by dividing the school-level variance by the total variance of the three levels. The differences between schools were larger in terms of the linear slope of both school enjoyment and independence (see Table 10 and 11, Model 1), but the variance between schools was relatively small with regard to quadratic slopes.

7.2. GROSS DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE SCHOOLS.

In order to examine the first research question, regarding the gross differences between traditional and alternative schools, the variable 'Alternative School', together with its interactions with the linear and quadratic slopes, were added to Model 1, the results are described in Model 2 (see Tables 10 and 11). Adding the effects of alternative schools and corresponding interactions with the linear and quadratic time variable, only improved model

fit with regard to independent participation (school enjoyment, $\Delta\chi^2$ (3) = 5, *ns*; independent participation, $\Delta\chi^2$ (3) = 10, $p < .05$). The results of model 2 indicate that there were no significant differences in school enjoyment or independent participation of children in alternative versus traditional schools (Model 2 in Tables 10 and 11). The proportion of the total variance explained (R^2) was calculated by comparing the school-level variance of the intercept of model 2 to the school-level variance of Model 1. Compared to model 1, the inclusion of the variable 'Alternative school' and its interactions with time, predicted 0.00% of the school-level variance of school enjoyment, and 11.11% of the school-level variance in independent participation.

7.3. NET DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE SCHOOLS

To control for differences between schools in pupil intake characteristics, we included five covariates: gender, age (in months in April of kindergarten year), SES, initial language achievement and initial arithmetic achievement. The results showed that high SES children, high achievers, older children, and girls generally had higher scores for school enjoyment and independent participation (see Model 3, Table 10 and 11). After controlling for pupil background variables, there was no significant difference in school enjoyment between children in alternative and traditional schools, but children from alternative kindergartens were rated lower in terms of independent participation than their peers in traditional schools. There were no significant differences in terms of linear of quadratic slopes (Tables 10 and 11, Model 3). This means that children from alternative schools are rated lower in terms of independent participation in kindergarten, but that the evolution in independent participation does not differ from the evolution of children in traditional schools. The proportion of the total variance explained (R^2) was calculated by comparing the school-level variance of the intercept of model 3 to the school-level variance of Model 2. Model 3 did not explain substantial variance in the prediction of school enjoyment (0.00%). With regard to independent participation, the inclusion of the child-level covariates increased the school-level variance of the constant with 30.43%. This negative explained variance indicates that the inclusion of child-level covariates increased the differences between schools.

Table 10. ***Quadratic growth models comparing alternative versus traditional schools in the development of children's school enjoyment***

	Model 1		Model 2		Model 3		Model 4		Model 5	
Fixed Part	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Constant	5.06 ***	0.03	5.04 ***	0.03	5.16 ***	0.03	5.05 ***	0.03	5.16 ***	0.03
Time	0.26 ***	0.04	0.27 ***	0.04	0.27 ***	0.04	0.28 ***	0.04	0.27 ***	0.04
Time²	-0.19 ***	0.01	-0.19 ***	0.01	-0.20 ***	0.01	-0.20 ***	0.01	-0.20 ***	0.01
Alternative			0.12	0.08	-0.02	0.08	-0.03	0.08	0.04	0.08
Time.Alternative			-0.03	0.12	-0.03	0.12	-0.03	0.13	-0.05	0.13
Time².Alternative			0.00	0.04	0.00	0.04	0.01	0.04	0.01	0.04
Gender					-0.18 ***	0.01	-0.18 ***	0.01	-0.18 ***	0.01
Age					0.00	0.00	0.00	0.00	0.00	0.00
SES					0.06 ***	0.01	0.03	0.02	0.06 ***	0.01
ILA					0.01 ***	0.00	0.01 ***	0.00	0.01 ***	0.00
Initial Aritmetic Ach.					0.01 ***	0.00	0.01 ***	0.00	0.01 ***	0.00
Time.SES							0.07 **	0.03		
Time².SES							-0.02 *	0.01		
SES.Alternative							0.08	0.06		
SES.Time.Alternative							-0.09	0.10		
SES.Time².Alternative							0.01	0.03		
Time.ILA									0.00 *	0.00
Time².IAA									0.00 *	0.00
ILA.Alternative									-0.01 *	0.01
ILA.Time.Alternative									0.00	0.01
ILA.Time².Alternative									0.00	0.00
Variance components										
Level: Schools										
Constant/Constant	0.09	0.01	0.09	0.01	0.09	0.01	0.09	0.01	0.09	0.01
Time/Constant	-0.08	0.02	-0.08	0.02	-0.08	0.02	-0.07	0.02	-0.08	0.02
Time/Time	0.20	0.03	0.20	0.03	0.19	0.03	0.19	0.03	0.19	0.03
Time²/Constant	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00
Time²/Time	-0.06	0.01	-0.06	0.01	-0.05	0.01	-0.05	0.01	-0.06	0.01
Time²/Time²	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00
Level: Pupils										
Constant/Constant	0.09	0.01	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Time/Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time/Time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time²/Constant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time²/Time	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time²/Time²	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Level: Tijd										
Constant/Constant	0.33	0.01	0.33	0.01	0.38	0.01	0.38	0.01	0.38	0.01
IGLS Deviance	21,789		21,784		21,524		21,514		21,500	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; all predictors except gender and Time were grand mean centred. ILA =Initial language achievement, SES = Socio Economic Status, Ach.= Achievement.

Table 11. ***Quadratic growth models comparing alternative versus traditional schools in the development of children's independent participation***

	Model 1		Model 2		Model 3		Model 4		Model 5	
Fixed Part	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Constant	4.23 ***	0.03	4.21 ***	0.03	4.33 ***	0.04	4.33 ***	0.04	4.33 ***	0.04
Time	-0.34 ***	0.04	-0.35 ***	0.05	-0.35 ***	0.05	-0.35 ***	0.05	-0.35 ***	0.05
Time²	0.09 ***	0.01	0.09 ***	0.01	0.09 ***	0.01	0.09 ***	0.01	0.09 ***	0.01
Alternative			0.17	0.09	-0.25 *	0.11	-0.27 *	0.11	-0.17 *	0.11
Time.Alternative			0.13	0.13	0.13	0.13	0.20	0.14	0.09	0.14
Time².Alternative			-0.05	0.04	-0.05	0.04	-0.07	0.05	-0.04	0.04
Gender					-0.07 *	0.02	-0.07 *	0.02	-0.07 *	0.02
Age					0.01 ***	0.00	0.01 ***	0.00	0.01 ***	0.00
SES					0.15 ***	0.02	0.13 ***	0.02	0.14 ***	0.02
ILA					0.02 ***	0.00	0.02 ***	0.00	0.02 ***	0.00
Initial Aritmetic Ach.					0.05 ***	0.00	0.05 ***	0.00	0.05 ***	0.00
Time.SES							0.01	0.03		
Time².SES							0.01	0.01		
SES.Alternative							0.07	0.08		
SES.Time.Alternative							-0.18	0.12		
SES.Time².Alternative							0.03	0.04		
Time.ILA									0.00	0.00
Time².ILA									0.00	0.00
ILA.Alternative									-0.02 **	0.01
ILA.Time.Alternative									0.01	0.01
ILA.Time².Alternative									0.00	0.00
Variance components										
Level: Schools										
Constant/Constant	0.09	0.02	0.08	0.02	0.15	0.02	0.15	0.02	0.16	0.02
Time/Constant	-0.09	0.02	-0.09	0.02	-0.08	0.02	-0.08	0.02	-0.08	0.02
Time/Time	0.22	0.03	0.22	0.03	0.22	0.03	0.22	0.03	0.22	0.03
Time²/Constant	0.02	0.01	0.02	0.01	0.02	0.01	0.018	0.01	0.02	0.01
Time²/Time	-0.07	0.01	-0.07	0.01	-0.07	0.01	-0.068	0.01	-0.07	0.01
Time²/Time²	0.02	0.00	0.02	0.00	0.02	0.00	0.023	0.00	0.02	0.00
Level: Pupils										
Constant/Constant	0.46	0.03	0.46	0.03	0.16	0.02	0.158	0.02	0.16	0.02
Time/Constant	-0.04	0.03	-0.04	0.03	-0.04	0.02	-0.039	0.02	-0.04	0.02
Time/Time	0.20	0.05	0.20	0.05	0.20	0.05	0.201	0.05	0.20	0.05
Time²/Constant	0.01	0.01	0.01	0.01	0.01	0.01	0.012	0.01	0.01	0.01
Time²/Time	-0.04	0.01	-0.04	0.01	-0.04	0.01	-0.038	0.01	-0.04	0.01
Time²/Time²	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Level: Tijd										
Constant/Constant	0.46	0.01	0.46	0.01	0.46	0.01	0.455	0.01	0.46	0.01
IGLS Deviance	28951		28941		27373		27362		27371	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; all predictors except gender and Time were grand mean centred. ILA =Initial language achievement, SES = Socio Economic Status, Ach. = Achievement.

7.4. DIFFERENTIAL EFFECTS IN TERMS OF SES AND INITIAL ACHIEVEMENT

To examine the possible differential effects of alternative education in terms of children's SES and initial language achievement, interaction terms between SES (Model 4) and initial language achievement (Model 5) on the on hand, the time variables and the Alternative school variable on the other hand, were added in Model 3. The final models (Models 4 and 5)

are represented in Tables 10 and 11. In traditional schools, children's initial language achievement and SES were related to school enjoyment and independent participation. Children who have a lower initial language achievement or a lower SES, tended to have lower school enjoyment and independent participation (Models 4 and 5 in Table 10). However, no significant differential effects were found. This means that the gap in school engagement (school enjoyment and independent participation) between high-SES and low-SES children is equally large in alternative schools compared to traditional schools.

With regard to initial language achievement as a risk indicator, differential effects were found. In alternative schools, the impact of initial language achievement in kindergarten on school enjoyment and independent participation was significantly smaller compared to traditional schools (Models 5 in Tables 10 and 11). Figures 13 and 14 display the slopes of children with a high (1 standard deviation above the mean) and a low (1 standard deviation below the mean) initial language achievement in alternative and traditional schools. When

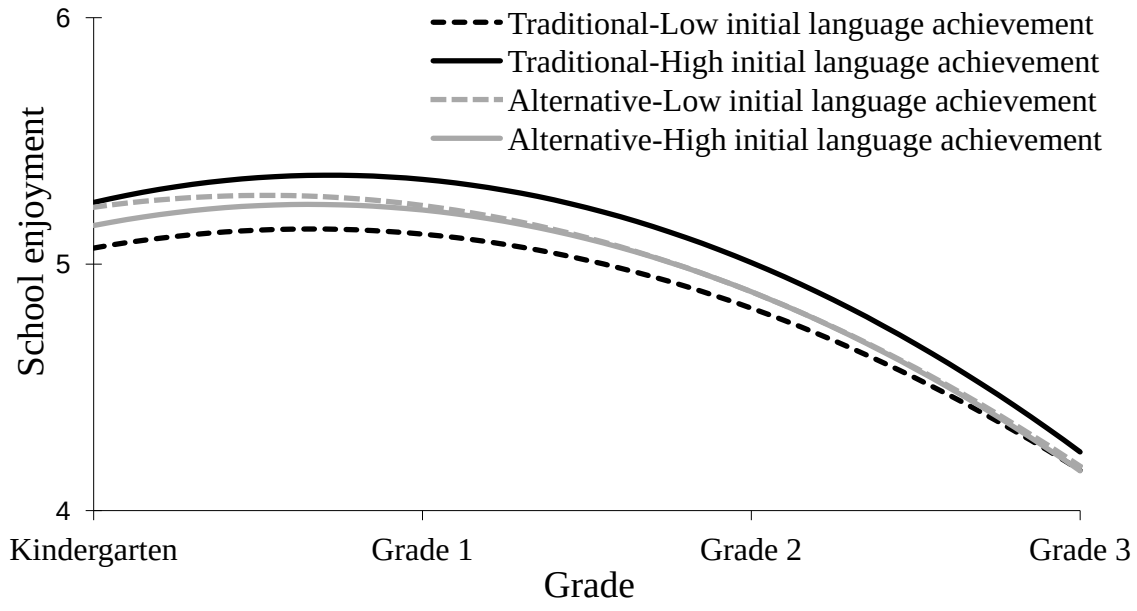

Figure 13. **Different growth curves in children's school enjoyment of children with a high (+1 SD above the grand mean) and low (-1 SD below the grand mean) initial language achievement in alternative and traditional schools.**

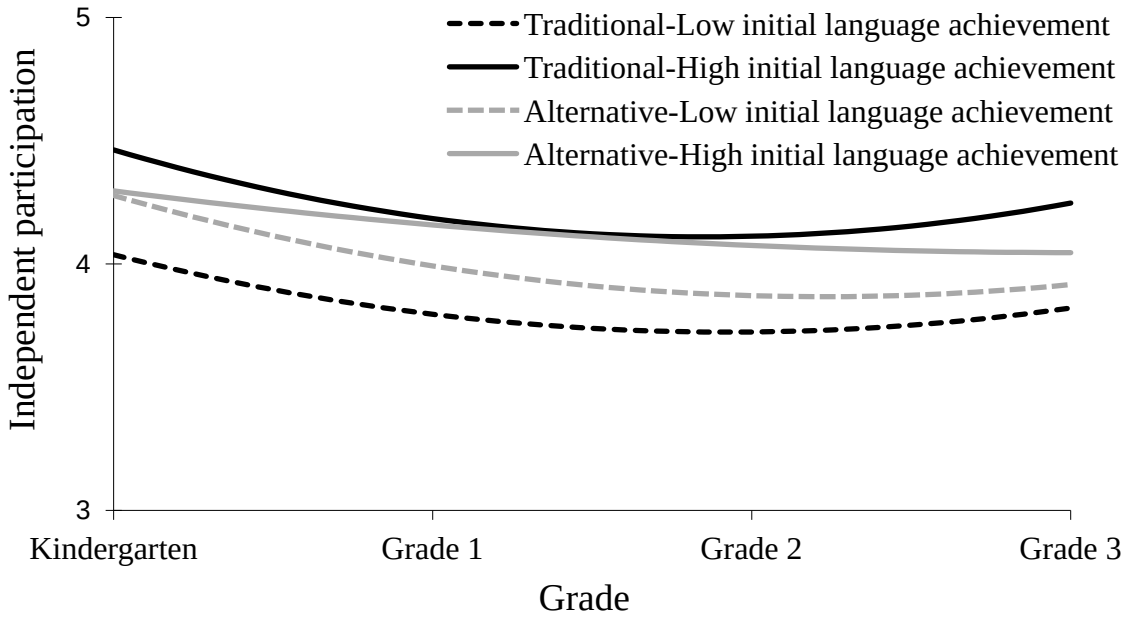

Figure 14. **Different growth curves in children's independent participation of children with a high (+1 SD above the grand mean) and low (-1 SD below the grand mean) initial language achievement in alternative and traditional schools.**

comparing the effect of alternative education on school enjoyment among children with either a high (1 standard deviation above the mean) and low (1 standard deviation below the mean) initial language achievement, there were no differences. For both groups, alternative education did not relate to levels of school enjoyment. Regarding the effects of alternative education on independent participation, it was found that the differential effect could be explained by examining simple slopes (Aiken & West, 1991). For children with a high (+1SD) initial language achievement (intercept β = -0.37, p <.01) or an average initial language achievement (see model 5), being in an alternative school was negatively related to their independent functioning in kindergarten, while for children from a lower (-1SD) initial language achievement, no significant relationship was found (intercept β = 0.13, *ns*). For both groups, no differences were found in the effects of alternative education on the slope in independent participation.

8. DISCUSSION

Schools with an alternative pedagogical approach, like Steiner/Waldorf schools, Montessori schools, Dalton schools and Freinet schools, are becoming increasingly popular. These schools work in an alternative fashion, putting more emphasis on child-centred learning, cooperative learning, experiential learning, etc., than traditional schools. Since these practices have often proven to promote children's school engagement, motivation and achievement (Wigfield et al., 1998; Seidel & Shavelson, 2007), the question can be raised whether these alternative schools have an impact on children's school engagement. However, not much research has been done so far to examine these questions. In particular, Freinet schools have seldom been the subject of research. This study aimed to examine the impact of a school's alternative versus traditional pedagogical approach on changes in children's school enjoyment (as an indicator of emotional engagement) and independent participation (as an indicator of behavioural engagement) between kindergarten and third grade.

The first research question pertained to the 'gross' (i.e. uncontrolled) differences between alternative and traditional schools on children's motivational growth trajectories. Because alternative schools generally differ from traditional schools with regard to pupil intake characteristics, the second research question pertains to the 'net' (i.e. controlled) differences in motivational growth between alternative and traditional schools. We controlled for gender, age, SES, initial language achievement and initial arithmetic achievement. The third main question regarded differential effects for advantaged and disadvantaged children. More specifically, we examined whether alternative education has a differential effect for children with a lower SES or lower initial language achievement compared children with a higher SES or initial language achievement.

8.1. GROSS DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE SCHOOLS

When examining the gross (i.e. uncontrolled) effect of alternative education on school engagement, no significant differences were found comparing traditional schools with alternative schools. On average, children in alternative schools are rated equally high by

their teachers in terms of school enjoyment and classroom independent participation. These results are not in line with the findings of Brutsaert (1993) and Steenbergen (2009) who found that children from Steiner/Waldorf schools generally differed on several scales related to school engagement without taking into account background variables.

8.2. NET DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE SCHOOLS

Because alternative schools and traditional schools differ in terms of child background characteristics (e.g. children in Freinet schools have a higher SES, children in Steiner/Waldorf schools are generally older) and because these differences could influence observed differences between schools, it was examined whether the effect of an alternative pedagogical approach would change after taking into account child characteristics (gender, age, SES and initial achievement). While no overall gross differences were found between alternative and traditional schools, when comparing them after taking into account the differences in pupil population, children in alternative schools were rated by their teachers as acting less independent than their peers in traditional schools. This could indicate that alternative schools generally have a negative impact on children's independent participation. Surprisingly, these differences were already observed at the beginning of the study (in the third year of kindergarten). This can mean two things. First, these results can indicate that the school effects might already have taken place in the first and second year of kindergarten. Second, these results might be caused by initial differences in children's level of independence prior to entering education. This would mean that children who have a tendency to act dependent towards others might have a bigger propensity to enter an alternative school.

Concerning the net effects of alternative education on children's non-cognitive functioning, previous research revealed mixed results. Brutsaert (1993) found that children in Steiner/Waldorf schools were less engaged in their studies. Steenbergen (2009) found a mixed pattern of effects of Steiner/Waldorf education. Children in Steiner/Waldorf schools had a less optimal school functioning, in terms of extraversion, consciousness and emotional stability. However, she did find a positive effect with regard to openness to experience, relationships with teachers and academic self-concept. The present research complements

previous studies, and indicated that children from alternative schools were rated as less independent in their school functioning compared to their peers in traditional schools after taking into account differences in background characteristics.

8.3. DIFFERENTIAL EFFECTS IN TERMS OF SES AND INITIAL ACHIEVEMENT

The third research question pertained to the examination of differential effects in terms of the gap in school engagement between disadvantaged children (in terms of SES and initial language achievement) and advantaged children. In terms of the difference in school engagement between low-SES and high-SES children, alternative schools do not succeed in reducing the gap in school enjoyment and the independent participation. No significant differential effects were found regarding SES as a risk indicator. However, in alternative schools, a significantly smaller gap was found between children with initial high and low language achievement, indicating that in alternative schools the level of initial language achievement is less determining for school enjoyment and independent participation than in traditional schools. Perhaps, because in alternative schools the focus is less on cognitive development, children with lower initial language achievement will not feel particularly incompetent, and be more engaged, compared to when they would have taken lessons in a school that was more focused on the development of basic skills and core knowledge. These results amplify the study by Steenbergen (2009). She found that, in Steiner/Waldorf schools, intelligence quotient was less determinative for children's self-concept. In fact, students with a higher intelligence quotient had an even lower academic self-concept then their peers with a lower intelligence quotient.

8.4. LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Five limitations require mentioning. First, although sometimes we referred to the term 'effect', the correlational nature of the data does not allow for causal interpretations. Second, because of the selection criteria used, eliminating all children changing schools and all grade retainers, results can hardly be seen as representative for the whole population of Flemish children in traditional or alternative schools. Especially in Steiner/Waldorf schools, in

which the transition from kindergarten to first grade comes at a later point in time, up to 35% of the children were excluded from the analyses. Future research incorporating longitudinal data from kindergarten to third grade, especially among Steiner/Waldorf schools, should be designed to account for this difference in policy and consequently a large percentage of missing data. This selection affected several factors; the mean level of SES, the mean level of initial achievement, etc. This selection bias might affect the representativeness of the results.

A third important limitation of the study is the teacher-rated character of the dependent variables, providing no clear conclusions about the real effects of alternative education. It is quite possible that teachers who use an alternative pedagogical approach and put more emphasis on children's school enjoyment and independent participation, may rate their children's non-cognitive functioning in a different way from teachers who operate in a more traditional fashion. For example, they could be better able to observe their pupils' school functioning, or they could be more critical in evaluating school enjoyment and independent participation (giving lower scores) because of the importance of these outcomes in alternative schools. Further research might include child-reported or observer-reported data. These might give an additional perspective on the school effects, as in the study of Doumen et al. (2012).

Fourth, the differences between the actual practice of alternative and traditional schools may not be as big as expected on the basis of official information about their pedagogical approach. For example, traditional education has changed during the last century, and current traditional schools are very different from the 'ecole caserne'. Most traditional schools in Flanders also make, to a lesser extent, use of innovative such as experiential learning, cooperative learning, active learning, etc. Moreover, there can be some doubt with regard to the extent to which the schools actually implement the official pedagogical approach. Sometimes, traditional schools which are unpopular, or which attract children with a lower social status, change their official pedagogical approach to an alternative one to attract more children or children with a higher social status. However, in practice, they only implement minor changes in their pedagogical approach or teacher corps. We tried to avoid this problem by only selecting the schools in which the principals declared that the actual pedagogical approach was the same as the official pedagogical approach, but this probably

could not fully avoid this problem. Future research might implement an implementation fidelity check, like Lillard (in press) implemented in her examination of the effects of Montessori schools.

Finally, there were no initial measurements of school enjoyment and independent participation available to act as a control. This might have affected the interpretation of the school effects. Indeed, one cannot assume that there were no differences between alternative and traditional schools with regard to initial school enjoyment or initial independent participation before the children enter school. Possibly, parents of children who are not very enthusiastic or independent, are more inclined to send their children to alternative schools. This might have affected the results, disfavouring alternative schools. Entering prior measures in future research will shed more light on the question whether the found negative impact of alternative education on independent participation is merely due to different intake characteristics or due to an early effect of alternative education in the first two grades of preschool.

8.5. CONCLUSION

Although alternative schools such as Freinet schools, Steiner/Waldorf schools, etc. are globally well-known and are becoming increasingly popular, little is known about their impact on children's development. The premise of the present study, that alternative education is beneficial for children's school enjoyment and independent participation, could not be supported. In contrast, evidence was found that alternative education might impact negatively children's independent participation in the class It was found that in alternative education, after control for differences in student background characteristics, children acted less independent compared to children in traditional schools. However, there is some evidence that in alternative schools, the gap between high and low initial achievers with regard to school enjoyment and independence, is smaller than in traditional schools.

5

Academic motivation and engagement in alternative schools

Manuscript submitted as:

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ABSTRACT

The present study examined student-reports on their academic motivation and engagement from 3896 students in sixth grade and followed them during their first year in secondary education. Central is the question if students who are enrolled in an alternative primary school are more motivated and engaged than peers who are enrolled in a traditional primary school. Three main findings emerged. First, both short-term and long-term effects of alternative education were found. Students in alternative schools were less autonomously as well as controlled motivated for school, the latter effect was even found one year after the transition to secondary education. Second, among students who come from an alternative primary school, the transition to secondary education is associated with a stronger decrease in school enjoyment and a stronger increase in controlled motivation. Third, the above effects are similar for both high-achieving and low-achieving students. One differential effect was found, more specifically in alternative schools the low-achieving students put less effort into mathematics compared to their low-achieving peers in traditional schools.

Keywords: alternative education, motivation, engagement, multilevel growth curve models

1. INTRODUCTION

Early adolescence is considered as a critical period in which students become less engaged and motivated for school work (e.g. Eccles, Wigfield, Harold, & Blumenfeld, 1993a; Fredericks & Eccles, 2002). Across the grades, students' engagement diminishes, both in terms of behavioural aspects such as effort expenditure (Yeung, 2011) as well as in terms of emotional aspects of engagement such school enjoyment, interest and intrinsic motivation (Gottfried, Fleming, & Gottfried, 2001; Yeung, 2011). Also in terms of underlying motivational processes, both students' autonomous (e.g., "because that's what I find important", "because I enjoy it") as well as their controlled motivation (e.g., "because I have to", "because I would feel guilty if I didn't") for working for school diminishes (Gillet, Vallerand, & Lafrenière, 2012). This negative spiral may lead some adolescents to academic failure and school dropout (Eccles, et al., 1993b). Especially the transition between primary and secondary education constitutes a risk (Feldlaufer, Midgley, & Eccles, 1988; Mac Iver & Epstein, 1991).

Several hypotheses have been formulated to explain the decrease in academic engagement and motivation, and more specifically the drop during the transition from primary to secondary education. Some scholars claim that this decrease is due to a mismatch in fit between students' needs and the school environment (Eccles et al., 1993b). Early adolescents need support and guidance and at the same time they need increasing autonomy support (Mac Iver & Epstein, 1991). Secondary schools, in contrast to elementary schools, are characterized by a greater emphasis on teacher control and discipline and fewer opportunities for student decision making, choice and self-management (Feldlaufer, Midgley, Eccles, & Michigan, 1988; Wigfield, Eccles, & Rodriguez, 1998). Accordingly, several educational practices have been suggested to prevent students losing their motivation for school. Especially autonomy support has received a wealth of attention, as Gillet, Vallerand, & Lafrenière (2012) evidenced that teachers' autonomy support can attenuate the decline in autonomous motivation.

2. ALTERNATIVE EDUCATION

Examples of such engagement and motivation enhancing educational practices may be found in alternative schools (e.g., Freinet schools, Steiner/Waldorf schools, Montessori schools). For example, Montessori schools use a variety of autonomy-supportive practices (Koh & Frick, 2010; Rathunde & Csikszentmihalyi, 2005). In Flanders (the Dutch speaking part of Belgium) alternative schools value the child-centred approach more than traditional schools. They consider the learning process as a process of self-development (Verhaeghe & Gadeyne, 2004). Observation studies (Van Heddegem, Laevers, & Van Damme, 2004) indicated that teachers in alternative schools adopt a more autonomy-supportive teacher style, devote more time to choice activities, and offer more freedom within these choice activities (e.g., more choice options, less rules). Teachers in alternative schools also value the classical instructional strategies less than their colleagues in traditional schools; they use less pre-existing handbooks and materials and less drill and practice as an instructional strategy (Verhaeghe & Gadeyne, 2004).

3. PREVIOUS STUDIES

3.1. MAIN EFFECTS

The effects of alternative schools on students' school engagement and academic motivation has seldom been the object of study. In our literature review, we selected only the studies that controlled for differences between schools in student intake. Previous studies examining the effects of alternative education on school engagement revealed mixed results. In the early years of education (de Bilde, Van Damme, Lamote, & De Fraine, in press), no evidence was found for a positive effect of alternative education on students' school engagement. Students in alternative schools even acted less autonomously compared to their peers in traditional schools. At the end of primary education, Brutsaert (1993) evidenced that students in Flemish Steiner/Waldorf schools (a specific type of alternative education) reported to be less positive about their school, to have a lower general self-concept, and to be less involved in their studies. A study among seventh and ninth grade secondary students (Steenbergen, 2009) found positive effects of Steiner/Waldorf education on motivation and engagement. Between seventh and ninth grade, students in

Steiner/Waldorf schools reported increasingly better relationships with their teachers and reported increasing use of self-regulated learning strategies, compared to the development in traditional schools. Further, Steenbergen evidenced that the decline in academic engagement was smaller in Steiner/Waldorf schools compared to traditional schools.

3.2. DIFFERENTIAL EFFECTS

One can ask the question whether the effects of alternative education differ for different types of students. Some scholars argue that the drop in academic motivation and engagement is especially critical for students who are already at risk due to cultural, socio-economic or functional risk factors (e.g., Espinoza & Juvonen, 2011). In the present study, we will study whether alternative schooling has a differential effect on students with high versus low initial mathematics achievement. Mathematics achievement is related to a variety of school outcomes: socio-emotional functioning, later achievement, dropout, and career aspirations (Duncan et al., 2007; Alexander, Entwistle, & Horsey, 1997; Shapka, Domene, & Keating, 2012). The studies including differential effects found only limited, and often conflicting evidence for differential effects. While de Bilde et al. (in press) found a smaller difference in terms of school engagement between high and low achieving students in alternative schools, Steenbergen (2009) evidenced that the difference between high and low SES students in terms of academic engagement and self-regulated learning strategies is larger in Steiner/Waldorf schools.

3.3. RESEARCH GOALS

This study aimed at examining the impact of a school's pedagogical approach (alternative versus traditional) on a) students' motivation and achievement levels at the end of sixth grade and b) the changes in motivation and engagement after the transition to secondary education. Following the distinction between main and differential effects, the effects of alternative education on academic motivation and engagement will be examined among 'average' pupils (i.e., controlling for student characteristics), and among low and high math achievers.

4. METHOD

4.1. DATA AND PROCEDURE

The study is based on data from the SiBO project (SiBO is the Dutch acronym for School Careers in Primary Education; Maes, Ghesquière, Onghena, & Van Damme, 2002). This is a longitudinal study in Flanders (Belgium) following a cohort of students through their early school career. In the SiBO project, information is collected about the child, family, teacher, classroom, school and senior management. The present study consists of data regarding students in the representative sample of 120 Flemish schools (of which 2 are alternative schools), and an oversampling of 30 extra alternative schools.

In total data were used from 3896 students enrolled in school year 2008-2009 in sixth grade in a participating school. Of these students, 3385 students were enrolled in 113 traditional schools, 511 students were enrolled in 31 alternative schools. After sixth grade, the majority of the students entered the general track in secondary education (90.22% of the students from traditional schools and 91.78% of the students from alternative schools). A small number of students enter the pre-vocational track in secondary education (7.15% of students in traditional education and 3.72% of students in alternative education). From these two groups, information was collected on their school functioning in secondary education. The other students (2.63% of students in traditional schools and 4.50% of students in alternative schools) have an atypical school career after sixth grade (grade retention, transition to special education) or missing data on their school career. In total the students of which data were collected were enrolled into 554 different secondary schools, with 208 secondary schools having only one student of the SiBO sample. One secondary school (with 38 students) adhered explicitly an alternative approach. Of the other schools we have no information on their pedagogical approach.

4.2. INSTRUMENTS

Students' self-reported engagement and motivation. At the end of sixth grade (Vandenberghe, Cortois, de Bilde, Verschueren, Van Damme, 2011) and at the end of their first year in secondary education, students filled in a questionnaire about their school engagement and academic motivation. All items were presented on a Likert-type scale from

1 (*not true*) to 5 (*true*). In total four scales were assessed. Eight items assessed students' *school enjoyment* (e.g., "I find most class activities enjoyable", Grade 6: α = .83, Grade 7: α = .83). The scale measuring *effort expenditure* measured the amount of effort students put in mathematics. Mathematics was chosen because mathematics lessons are rather similar in both elementary and secondary education. The scale was based on the scale created by Eccles (Watt, 2000; e.g. "I work hard for mathematics", 2 items, Grade 6: α = .83, Grade 7: α = .85). To assess students' academic motivation, the academic self-regulation questionnaire (see Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009) was used. The question "Why do I work hard for school?" was presented. Thereafter students were asked to evaluate 12 motivations on the same Likert type scale. The scale *autonomous motivation* tapped into students' autonomous (i.e. intrinsic and identified) reasons for doing their best at school ("Because I find it interesting", "Because this is important for me", 4 items, sixth grade: α = .70, seventh grade: α = .76). Eight items tapped into *controlled* (i.e. extrinsic and introjected) *motives* for working for school ("Because it is expected of me", "Because otherwise I would feel guilty", 8 items, sixth grade: α = .80 seventh grade: α = .78).

Academic achievement. Four achievement domains were tested: mathematics, spelling, reading fluency and reading comprehension (for more information see Cortois, Van Droogenbroeck, Verachtert, & Van Damme, 2011). The mathematics, spelling and reading comprehension tests were assessed at the end of sixth grade, the reading fluency test was assessed at the end of fifth grade. The *mathematics test* assesses mental calculation, mathematics, problem-solving, measurements in applied settings, geometry, and ciphering (64 items; version A: α = .88 and Version B: α = .89, both versions were calibrated using IRT (Thissen & Wainer, 2001)). *The spelling test* (Moelands & Rymenans, 2003a) contained 40 words which were verbally introduced within sentences (α = .87). The *reading fluency test* ('three-minute test'; Moelands & Rymenans, 2003b) assessed the number of words students can accurately read in three minutes. The *reading comprehension tests* (Version A: 39 items, α = .76 and Version B: 41 items, α = .78, both versions were calibrated using IRT (Thissen & Wainer, 2001). The tests are a shortened version of the original tests; Staphorsius & Krom, 1998) and comprised short texts, followed by a number of multiple-choice questions regarding the text.

Table 12. ***Descriptives of the major variables***

Variables	N	% Missing	Min.	Max.	Mean	SD
Covariates						
Gender	3889	0.2%	0	1.00	0.50	0.50
Birth Month	3888	0.2%	1.00	12.00	6.48	3.39
Birth Year	3888	0.2%	-3.00	2.00	-0.16	0.44
Diagnosis	3534	9.3%	0.00	1.00	0.13	0.34
SES	3354	13.9%	-1.98	1.39	0.15	0.64
Language spoken at home	3270	16.1%	0.00	1.00	0.07	0.26
Cultural Environment	3300	15.3%	1.00	6.00	3.94	1.01
Social Environment	3314	14.9%	1.00	4.00	1.98	0.40
Fluid intelligence	3098	20.5%	9.00	55.00	36.17	7.56
Mathematics	3640	6.6%	81.05	130.57	107.00	8.34
Spelling achievement	3620	7.1%	74.00	157.00	126.82	9.11
Reading Fluency achievement	3551	8.9%	42.00	420.00	260.63	48.36
Reading Comprehension achievement	3648	6.4%	36.50	81.09	59.48	7.85
Pre-vocational Track	3019	22.7%	0	1	.07	0.25
Dependent variables						
School Enjoyment Grade 6	3558	8.7%	1.00	5.00	3.69	0.82
School Enjoyment Grade 7	3012	22.7%	1.00	5.00	3.67	0.73
Effort expenditure Grade 6	3564	8.5%	1.00	5.00	3.59	1.02
Effort expenditure Grade 7	3019	22.5%	1.00	5.00	3.62	0.99
Autonomous Motivation Grade 6	3551	8.9%	1.00	5.00	3.84	0.81
Autonomous Motivation Grade 7	3000	23%	1.00	5.00	3.63	0.87
Controlled Motivation Grade 6	3547	9.0%	1.00	5.00	2.89	0.89
Controlled Motivation Grade 7	2998	23%	1.00	5.00	3.11	0.83

Note. SES = Socio-economic Status.

Home environment. The parent questionnaire was administered in 2006-2007 (Van Droogenbroeck, Vanderstichele, de Bilde, Speybroeck, & Van Damme, 2010). The parent questionnaire provided information about the family's socio-economic status (SES), the language spoken at home, the family's cultural capital and the child's social environment. The SES variable was based on mother's and father's educational level, their professional status, and the family income. The parent questionnaire also provided information about *the dominant language spoken at home*. A distinction was made between Dutch-speaking families and foreign language -speaking families. Third, parents filled in two Likert type questionnaires on a six point scale varying from one (totally not applicable) to six (very applicable) providing information about the family's *cultural environment* (4 items, e.g., "In

our family, we watch the TV news daily"; α = .67) and *social environment* (4 items, e.g., "We often go on family visit").

Intelligence. In school year 2005-2006, when on-track students were in third grade, an intelligence test was conducted that assessed students' fluid intelligence; the standard progressive matrices (SPM; Raven, Raven, & Court, 2000). This is a non-verbal test with 60 items using meaningless figures. One has to find the missing figure from six or eight possibilities using inductive reasoning (Hendrikx, Maes, Ghesquière, & Van Damme, 2007).

Diagnosis. Finally, the school's care co-ordinator (or the teacher) indicated in a questionnaire which students had a certain diagnosis (Van Droogenbroeck, Ghesquière, Gadeyne, Vandenberghe, & Van Damme, 2011). A diagnosis can be related to learning (e.g. dyslexia), physical (e.g., chronic disease), behavioural (e.g. oppositional defiant disorder) or emotional problems (e.g. depression). The three most common diagnoses were dyslexia, ADHD and dyscalculia. Only the diagnoses of which a motivated report was written by a professional diagnostician were considered.

4.3. DATA ANALYSIS

Missing covariates were imputed using EM in SPSS 19.0 in accordance with best practices (Graham, 2009; Widaman, 2006). To take into account the multilevel structure of the data, hierarchical growth curve models (Snijders & Bosker, 1999) were estimated with three levels (measurements within students within schools). The primary schools was used to cluster students into schools. Because of the large variability of secondary schools (with often only few students in a secondary school) the secondary school was not included in the analysis. Using MLWin, the development of school engagement and motivation was examined using linear growth curves. We modelled the development of school achievement using a linear function. The intercept indicated the average estimates in sixth grade, the linear slope (coded 0 and 1) indicated the difference between sixth and seventh grade. The intercept and slope were allowed to vary at the school and pupil level, creating saturated models. In a next step, the pupil-level covariates, together with their interaction term with the slope were included to take into account differences between schools in pupil intake characteristics when comparing alternative and traditional schools. All covariates (except gender, diagnosis and birth year) were grand mean centred.

Because of the large number of parameters in the models, the criteria for significance will be narrowed to α = .01 in all primary analyses. To examine the first research question about main effects of alternative education, the dummy variable 'alternative' was entered into the model, together with the interaction terms with time, providing information about the main effect of alternative education on students' development of motivation and engagement. . Finally, the effects of alternative education at the end of seventh grade were also examined. To examine the differential effects of alternative education, cross-level interaction terms between a) sixth grade mathematics achievement, b) the slope and c) the dummy 'alternative' were entered, providing an answer to the question whether the impact of alternative education is different depending on students' mathematics achievement. Using simple slopes (Aiken & West, 1991), the impact of alternative education on motivation and engagement was estimated for students who scored one standard deviation below the grand mean and for students who scored one standard deviation above the grand mean.

5. RESULTS

5.1. DESCRIPTIVES

Descriptive statistics of the study's main variables can be found in Table 12. The percentages of missing data varied between 0.2% and 22.7% (see Table 12). At the student level ANOVA's were run to examine the differences between traditional and alternative schools regarding this study's major covariates. Traditional and alternative schools do not differ in terms of gender distribution ($F(1, 3887) = 0.18$, *ns*), average birth month ($F(1, 3886) = 0.28$, *ns*), or average prior reading fluency ($F(1, 3549) = 1.00$, *ns*). Small significant differences were found in terms of percentage of foreign language speaking families ($Percentage_{Traditional}$ = 7%, $Percentage_{Alternative}$ = 2%, $F(1, 3268) = 5.24$, $p < .05$), initial spelling achievement ($Mean_{Traditional}$ = 126.65, $Mean_{Alternative}$ = 125.03, $F(1, 3618) = 6.04$, $p < .05$), and fluid intelligence score ($Mean_{Traditional}$ = 35.77, $Mean_{Alternative}$ = 36.26, $F(1, 3096) = 4.817$, $p < .05$). Alternative schools do have a significant larger population of students who are at least one year older ($Percentage_{Traditional}$ = 15%, $Percentage_{Alternative}$ = 22%, $F(1, 3886) = 9.56$, $p < .01$), or have a diagnosis ($Percentage_{Traditional}$ = 12 %, $Percentage_{Alternative}$ = 21%, $F(1, 3532) = 27.56$, $p < .001$). Further, students in alternative schools have a family background which is characterized by a higher average SES ($Mean_{Traditional}$ = 0.12, $Mean_{Alternative}$ = 0.37, $F(1, 3352)$ =

53.75, $p < .001$), a higher average cultural environment ($Mean_{Traditional} = 3.92$, $Mean_{Alternative} = 4.10$, $F(1, 3298) = 11.85$, $p < .01$), and more interactions with their parents ($Mean_{Traditional} = 1.97$, $Mean_{Alternative} = 2.03$, $F(1, 3312) = 8.97$, $p < .01$). At the end of grade six, students in alternative school have on average lower mathematics scores ($Mean_{Traditional} = 106.90$, $Mean_{Alternative} = 104.96$, $F(1, 3638) = 12.34$, $p < .001$), but higher scores in reading comprehension ($Mean_{Traditional} = 59.00$, $Mean_{Alternative} = 60.13$, $F(1, 3646) = 17.23$, $p < .001$). These differences illustrate that student background characteristics must be taken into account in order to make a 'fair' comparison between schools.

5.2. THE GROWTH MODEL

Prior to our primary analyses we ran an empty growth curve model. On average, students' school enjoyment (B = -0.05, *ns*) and effort expenditure (B = 0.04, *ns*) did not change during seventh grade. There was a significant decrease in autonomous motivation (B = -0.21, $p < .001$) and an increase in controlled motivation (B = 0.23, $p < .001$) during the first year of secondary education. The percentage variance at the school level of the intercept varied between 3.99% (effort expenditure) and 13.23% (school enjoyment). The percentage variance at the school level of the slope varied between 0.65% (controlled motivation) and 10.46% (school enjoyment).

5.3. MODEL WITH CHILD-LEVEL COVARIATES

All thirteen covariates (gender, birth month, birth year, diagnosis, language spoken at home, SES, family's cultural and social environment, fluid intelligence, mathematics achievement, spelling, reading fluency and reading comprehension) were entered together with their interaction terms with the slope. These interaction terms were entered to take into account the effect of the covariates on the engagement and motivation growth curves. In total 26 parameters were added to the model. In general, boys showed a poorer quality of motivation (lower levels of effort expenditure, school enjoyment and autonomous motivation). Students from a foreign language-speaking family scored higher on all outcomes. Although prior achievement scores (mathematics, reading comprehension,

Table 13. ***Multilevel quadratic growth models comparing alternative versus traditional schools on students' development of school enjoyment, effort expenditure, autonomous motivation and controlled motivation.***

	School Enjoyment		Effort Expenditure		Autonomous Motivation		Controlled Motivation	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Intercept	3.81 ***	0.04	3.64 ***	0.04	3.96 ***	0.04	2.82 ***	0.04
Slope	-0.03	0.03	0.04	0.04	-0.25 **	0.03	0.29 ***	0.03
Covariates[a]								
Alternative	0.08	0.07	-0.04	0.06	-0.16 **	0.06	0.27 ***	0.05
Alternative.Slope	-0.17 **	0.05	0.08	0.05	0.07	0.04	0.10 **	0.04
Differential Effects								
Mathematics	*0.01* **	*0.00*	*-0.02* ***	*0.00*	*0.01* **	*0.00*	*0.00*	*0.00*
Mathematics.Slope	*-0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*-0.00*	*0.00*
Alternative.Mathematics	*0.00*	*0.01*	*0.02* **	*0.01*	*0.00*	*0.01*	*-0.00*	*0.01*
Alternative.Mathematics.Slope	*-0.00*	*0.00*	*-0.02* **	*0.01*	*-0.00*	*0.00*	*-0.00*	*0.01*
Random Part								
Level:Schools								
Intercept variance	0.08	0.01	0.03	0.01	0.06	0.01	0.02	0.00
Intercept.Slope covariance	-0.06	0.01	-0.02	0.01	-0.03	0.01	0.00	0.00
Slope variance	0.05	0.01	0.02	0.01	0.01	0.00	0.00	0.00
Level:Pupils								
Intercept	0.53	0.01	0.88	0.02	0.55	0.01	0.68	0.02
Intercept.Slope	-0.29	0.01	-0.51	0.01	-0.27	0.01	-0.37	0.01
Slope	0.46	0.01	0.88	0.01	0.58	0.00	0.60	0.01
Level: Measurement								
Error Variance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-2*loglikelihood:	15258		19656		16815		17119	

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

a. For reasons of clarity, the 26 parameters indicating the influence of the covariates are not displayed.

spelling and fluid intelligence) were generally associated with adaptive outcomes, mathematics, reading comprehension or fluid intelligence were associated with less effort expenditure. Finally, frequent social interaction was positively associated with effort expenditure, school enjoyment and autonomous motivation.

5.4. MAIN EFFECTS

In sixth grade, students in alternative schools do not differ from their peers in traditional schools in terms of school enjoyment (see Table 13). However, a difference was found in change in school enjoyment between sixth and seventh grade. Students in alternative schools do enjoy their secondary school less than their primary school. However, by the end of seventh grade, no differences were found between traditional and alternative schools in terms of students' school enjoyment. Regarding effort expenditure, no differences were found between alternative and traditional schools.

In sixth grade, students in alternative schools gave lower scores on autonomous motivation for working for school, compared to their peers in traditional schools. Autonomous motivation decreases to an equal extent between sixth and seventh grade. Simple slope analysis indicated that in seventh grade, no differences between students who come from an alternative school and students who come from a traditional school were found on autonomous motivation. Further, students in alternative schools scored also lower on controlled motivation in sixth grade than their peers in traditional schools. Among both groups, controlled motivation increased during their first year in secondary education. This increase was the largest among students who come from an alternative school. At the end of seventh grade, students who were in an alternative school still had a lower controlled motivation than their peers who were in an traditional school.

5.5. DIFFERENTIAL EFFECTS

The interaction effects between mathematics achievement were not significant in the prediction of school enjoyment (see Table 13). There was no effect of alternative education on the level of school enjoyment for both low (B = 0.07, *ns*) and high (B = 0.10, *ns*) achieving students. The negative development in school enjoyment in alternative schools between

sixth and seventh grade was equally large for both low (B = -0.16, $p < .01$) and high achievers (B = -0.18, $p < .01$) in alternative schools (see Figure 15).

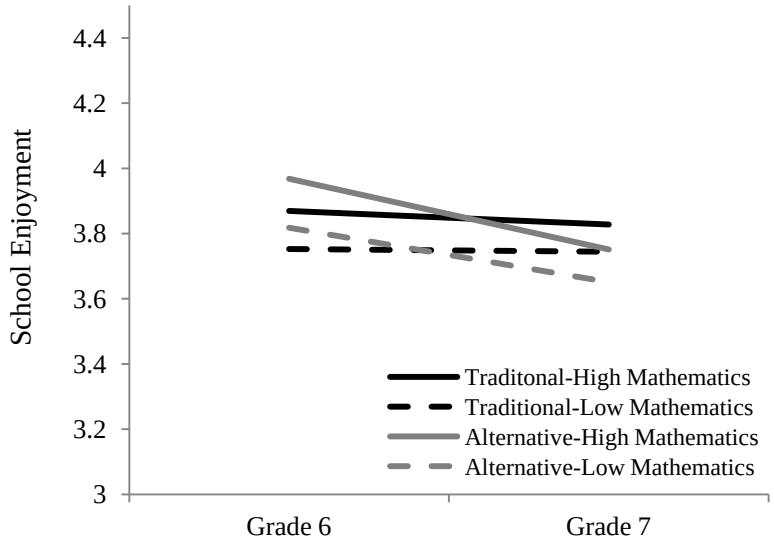

Figure 15. **Development in school enjoyment among students with a high and low mathematics achievement in alternative and traditional schools.**

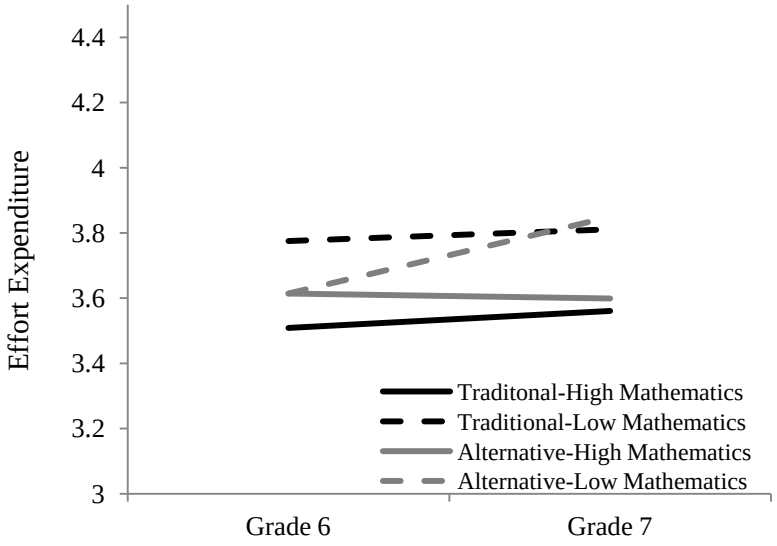

Figure 16. **Development in effort expenditure among students with a high and low mathematics achievement in alternative and traditional schools.**

As we mentioned above (cfr. Model with only covariates), initial (measured at end of sixth grade) mathematics achievement was negatively associated with effort expenditure, and

unrelated to change in secondary education. Table 13 indicates that this negative effect of mathematics achievement on effort expenditure differs between traditional and alternative schools. In traditional schools mathematics achievement is negatively related to students' scores in effort expenditure, and unrelated to change in secondary education. Among high-achieving students, no effect of alternative education was found on effort expenditure in sixth grade (B = 0.10, *ns*), nor on the change in secondary education (B = -0.06, *ns*). The low-achieving students from alternative schools do report less effort than low-achieving students in traditional schools (B = -0.15, $p < .05$). During the transition to secondary education, low-achieving students from alternative schools report an increasing amount of effort expenditure (B = 0.19, $p < .01$; see Figure 16).

With regard to motivational outcomes the differential effects were not significant (see Figures 17 and 18). The negative effect of alternative education on autonomous motivation in sixth grade was significant among both low (B = -0.15, $p < .01$) and high (B = -0.16, $p < .01$) achievers. Among both groups (low achieving: B = 0.06, *ns*; high achieving: B = 0.05, *ns*) there was no effect of alternative education on the change in autonomous motivation in secondary education. Similarly, the effect of alternative education on controlled motivation was equal among both groups. In both groups a negative effect on the intercept (low achieving: B = -0.27, $p < .001$; high achieving: B = -0.28, $p < .001$) and the positive effect on the slope (low achieving: B = 0.30, $p < .001$; high achieving: B = 0.27, $p < .001$) was found.

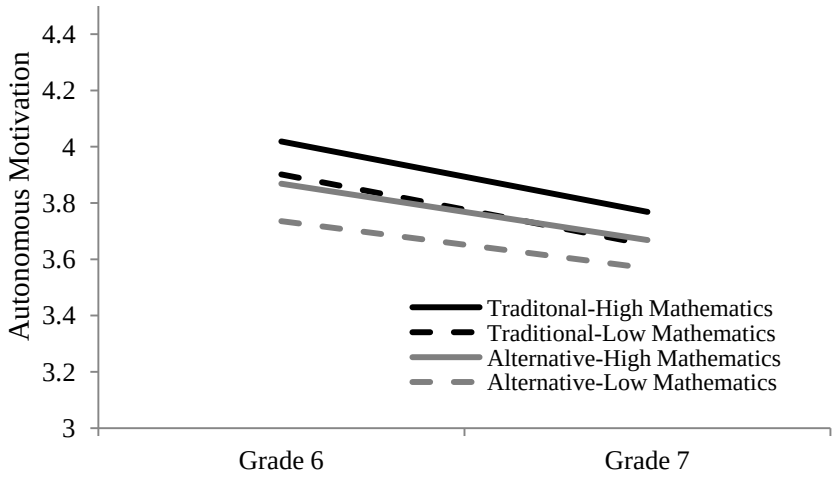

Figure 17. **Development in autonomous motivation among students with a high and low mathematics achievement in alternative and traditional schools.**

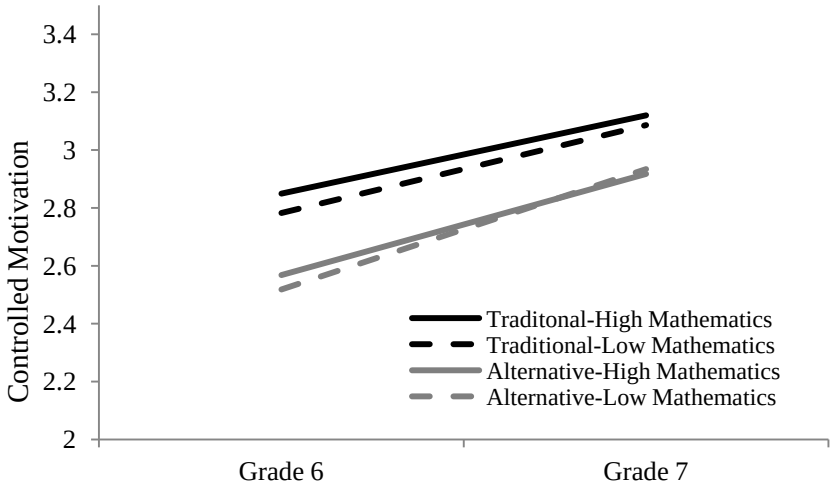

Figure 18. **Development in controlled motivation among students with a high and low mathematics achievement in alternative and traditional schools.**

6. DISCUSSION

Little research has been done so far to examine the question whether alternative education can improve students' school engagement and motivation. Our goal was to examine the impact of a school's alternative versus traditional pedagogical method on school engagement and motivation using two approaches. In the first approach the average level of school engagement and motivation was compared between students from alternative schools and students from traditional schools, controlling for differences in student population. The second approach examines the development after school transition. Because there are only a small number of alternative schools in secondary education, many students from alternative primary schools face an additional change besides the change from primary to secondary education, a change in pedagogical school culture. Three main findings emerged: a) sixth grade students in alternative schools felt less autonomously and controlled motivated to work for school, and low-achieving students reported to put less effort into mathematics, b) this effect on controlled motivation was persistent and even found one year after the transition to secondary education, c) especially students from alternative schools are affected by the transition to secondary education. After the transition to secondary education, they reported lower feelings of school enjoyment and increased controlled

motivation and the low-achieving students amongst them reported increased effort expenditure.

6.1. SHORT AND LONG TERM EFFECTS OF ALTERNATIVE PRIMARY EDUCATION

Alternative schools implement a variety of alternative practices (e.g. child-centred approach, less drill and practice, autonomy-supportive teacher style) which are generally known to improve students' autonomous motivation and increase engagement. However, the present study did not evidence that alternative schools improve students' autonomous motivation or engagement. In contrast, it was found that sixth-grade student in alternative schools reported to be less autonomously motivated compared to their peers in traditional schools. These results are similar to de Bilde et al. (in press), who evidenced a negative effect on autonomous participation in the early years of alternative education. Further, low-achieving students (in terms of their mathematics scores at the end of sixth grade) in alternative schools reported to put fewer effort into mathematics compared to their low-achieving peers in traditional schools. The negative effect of mathematics achievement[3] on effort expenditure in traditional schools was not found in alternative schools.

The present study also indicated that sixth-grade students in alternative education feel less forced and obliged to work on school tasks than students in traditional schools. This effect was even found one year after their transition to secondary education. This indicates that the primary schools' pedagogical approach can have a long-term effect of at least one year on students' controlled motivation. Lower scores on the controlled motivation composite of self-regulation indicate that alternative education can to some extent protect students from the forcing and controlling effect of traditional education. However, given the larger increase in controlled motivation (see below) among alternative-educated students, this long-term effect is likely to gradually disappear during the further years of secondary education.

[3] In contrast study studies in secondary education (e.g. Trautwein, Lüdtke, Roberts, Schnyder, & Niggli, 2009), in which generally a positive association between effort and achievement was found, in the present study mathematics achievement was negatively related to effort expenditure. This indicates that low-achieving students put more effort mathematics in order trying to compensate their lower mathematics achievement.

6.2. TRANSITION TO SECONDARY EDUCATION

The first year in secondary education is associated with declines in academic motivation. Similar to Gillet et al. (2012), our results showed that students' autonomous motivation generally decreased during the first year of secondary education, but in contrast to the results of Gillet et al. (2012) we found an increase in controlled motivation. The present study indicates that especially students who come from an alternative primary school are affected by the transition from primary to secondary education. Their school enjoyment significantly decreased and low-achieving students' effort expenditure increased, while no change in school enjoyment or effort expenditure was found among students who come from a traditional primary school. Further, the increase in controlled motivation that characterizes the transition to secondary education is especially large among students who come from an alternative school. These results suggest that the difference in approach between alternative primary and secondary schools might be larger, which results in (initial) adaptation difficulties.

6.3. LIMITATIONS

Three limitations require mentioning. First, although sometimes we referred to the term 'effect', the correlational nature of the data does not allow for causal interpretations. A second issue is that students from one elementary school often go to different secondary schools. As a consequence, most secondary schools have one or only few pupils of which data were collected. This precludes the use of multilevel models in secondary education, and certainly the use of cross-classified models. Using cross-classified models, we could have more clearly made a distinction between the primary school effect and the secondary school effect. Further, no data are available on the secondary school's pedagogical method or school culture. However, due to the small number of alternative secondary schools in Flanders, we can assume that most students who were enrolled in an alternative schools go the a traditional secondary school.

6.4. IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Although alternative schools adopt a child-centred approach, they do not necessarily lead to increased engagement or autonomous motivation. Instead, lower scores of autonomous as well as controlled motivation were found. This combination of both low autonomous and low controlled motivation can hardly be seen as a optimal motivational profile (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). These results raise questions about the effectiveness of alternative schools on students' academic engagement and motivation. How can alternative schools work on improving their students' autonomous motivation within an alternative context? To answer this question, further research is needed to shed light on mediating processes underlying these results. Future research could include several classroom processes (e.g., teacher style, structure and support) and might shed more light on why alternative schools do not succeed in promoting students' engagement and motivation.

The present study further indicates that the difficulties related to the transition from primary to secondary education, are not merely due to organizational and structural differences (new daily structure, several teachers, new peers), but that bigger differences between pedagogical approaches probably do also lead to an increasingly poor quality of motivation (less school enjoyment, more controlled motivation). The search for ways to keep students motivated and engaged is a challenge that both primary and secondary schools face.

6

General discussion

The four chapters presented in this dissertation all examined the effects of alternative education on students' achievement, academic engagement or motivation. We first give an overview of the dissertation's main findings, its strengths and limitations, then we highlight the dissertation's contribution to discussions about child-centred learning, differential effects and evidence-based practice. Finally, we give directions for future research.

1. THE EFFECTS ON ACADEMIC ACHIEVEMENT

This dissertation examined the effects of alternative education on students' achievement during primary education. One study focused on the effects of experiential education on the learning gain in mathematics and language achievement in kindergarten, the other study focused on the learning gain in achievement from first to sixth grade.

1.1. MATHEMATICS ACHIEVEMENT

Mathematics achievement was measured at the beginning and end of kindergarten and first grade, and from then on each year at the end of the school year. Chapter 3 clearly evidenced that alternative schools succeed to a lesser extent to improve students' mathematic achievement. While students from alternative and traditional schools have similar levels of mathematic achievement at the beginning of first grade, students in alternative schools learn at a slower pace, as compared to their peers in traditional schools. This effect can be considered large, as at the end of primary education students in alternative schools need an additional five months of education to be at the average level of their peers in traditional schools. Further, it was found that although these effects were found among both high-and low-achieving students, it was the largest among the high-achieving students. This means that the difference in mathematics learning gain in alternative schools compared to traditional schools is the largest for students who initially score higher on a language achievement test. This effect shows that in alternative education the achievement gap between high and low achievers is smaller, but mainly because the high-achieving students perform especially worse.

Two out of the five practices of experiential education were associated with a lower increase in mathematic achievement in kindergarten: the teacher's autonomy-supportive style and the percentage of time a teacher devotes to limited-choice activities (See Chapter 2). Teacher's autonomy-supportive style was especially harmful for students with poor initial language achievement. Further, the study indicated that one aspect of experiential education could compensate for at-risk students. Teachers' stimulating style led to increasing growth in mathematic achievement, especially among students with initial poor mathematics achievement.

1.2. LANGUAGE ACHIEVEMENT

In contrast to the results in mathematics, the effects of alternative education on language achievement outcomes such as spelling, reading fluency and reading comprehension are less clear. Regarding children's evolution in reading comprehension, alternative schools do not differ from traditional schools both in terms of their initial score in grade 3, as well as in their learning gain (see also Cunningham & Carroll, 2001). Regarding spelling and reading fluency, initial differences were found. At the end of first grade students from alternative schools performed lower on spelling and reading fluency. The effect on spelling was the strongest among initial poor performing students. However, by the end of primary education no evidence for a significant difference in spelling and reading fluency between alternative and traditional schools was found.

As we mentioned in the introduction section, evidence would have been stronger if we found effects on learning gain, instead of on the first measurement occasion. Although overall little evidence was found for the effect of alternative education on language achievement, chapter 2 does indicate that some aspects of alternative education could influence language achievement. As with mathematics achievement, we found that autonomy-supportive teachers have a negative effect on the language learning gain in kindergarten, but only among initially low achievers. Perhaps this effect is reflected by the lower initially score in spelling of children with low language achievement. Chapter 2 further evidenced that stimulation has a positive effect on the learning gain, among all students.

2. THE EFFECTS ON SCHOOL ENGAGEMENT AND MOTIVATION

The effects of alternative education on engagement both measured through teacher reports (Chapter 3 and 4) and student self-reports (Chapter 5) are less clear. Overall the effects are in disfavour of students in alternative schools. In terms of school enjoyment, which could be considered as an emotional aspect of school engagement (Fredericks, Blumenfeld & Paris, 2004), no differences were found between alternative and traditional schools. Both teachers in the early years of alternative education as well as students at the end of primary education did not report enjoying their school differently than their peers in traditional schools. The present dissertation did not evidence that alternative education impacts students' school enjoyment. However, three remarks must be made in that regard. First, we did found an effect on the transition to secondary education. The transition from the alternative primary school to the secondary school was related to a larger decrease in school enjoyment compared to the transition from traditional primary to secondary education. In an indirect way, this could say something about school effects. Although school effects are seldom examined by examining changes after school transition, it are especially the students who move from a high-supportive school environment to a low-supportive school environment that face difficulties in terms of their motivation and engagement, compared to their peers who did not encounter a change in school environment or a change from a low- to a high-supportive environment (Eccles, Midgley, Wigfield, Buchanan, Reuman, Flanagan, & Mac Iver, 1993). Secondly, we did found that one of the aspects of experiential education could influence school enjoyment. We found a small negative effect of observed teacher's autonomy-supportive style on teacher-reported school enjoyment (see Chapter 2). Thirdly, in alternative schools initial language achievement is somewhat less determinative for students' school enjoyment than in traditional schools (see Chapter 4). These three remarks suggest that, although no direct influence of alternative education on school enjoyment was found, there might be indirect paths by which alternative education influences school enjoyment.

In terms of more behavioural aspects of engagement in this study both independent participation (teacher-reports; Birch and Ladd, 1997), as well as effort expenditure (student-reports; Watt, 2000), were studied. Although we generally did found evidence of a negative

effect of alternative education on these behavioural aspects of engagement, we should be careful in drawing conclusions. First, negative effects of alternative education on both independent participation and effort expenditure were only found among a sub-population of students. The effect on independent participation was only found among students performing initially low to average on a language test. Similarly the negative effect on effort expenditure was only found among low-achievers on an initial mathematics test. Secondly, teachers in alternative education on average did report lower levels of independent functioning, but these effects were found at the first measurement occasion and not in terms of development over the years. Thirdly, although we did found a positive evolution in effort expenditure after the transition to secondary education, one could hardly argue that this is related to an effect of the primary school (see Chapter 5). Finally, when examining the specific aspects of experiential education, we could not identify alternative practices that are related to less independent participation. In contrast, chapter 2 indicates that devoting a lot of time for choice activities -whether these choices are restricted or not- was associated with higher independent participation, the latter (unlimited choice) being only advantageous for average achieving and high achieving students.

With regard to the underlying motivational processes, or self-regulation, to work for school, students from alternative schools are characterized by lower amounts of both controlled and autonomous motivation to work for school (see Chapter 5 for a further discussion). The effect on controlled motivation being the strongest, as it was even found one year after the transition to secondary education despite a growth in controlled motivation during the first secondary education. As is discussed in Chapter 5 this motivational profile (low autonomous and low controlled motivation) can hardly be seen as optimal for school functioning.

3. STRENGHTS AND LIMITATIONS

3.1. CRITERIA FOR EFFECTIVENESS

As mentioned in the introduction section, the question about the criteria for effectiveness can result in a variety of answers. Which goals do we want schools to reach? This dissertation focused on two aspects that are commonly considered as important educational

goals. On the one hand it focused on achievement; mathematics achievement, reading fluency and reading comprehension and spelling. Since the content of the mathematics, spelling and reading comprehension tests are related to and included in the Flemish educational attainment targets as well as in the attainment targets of Steiner/Waldorf schools, these outcomes could certainly be considered as important. Also reading fluency could be considered as an important educational outcome, because it functions as a necessary condition for optimal reading comprehension. However, one could also argue that the present achievement tests do not cover the full array of Flemish educational targets. For example, in the mathematics achievement test aspects with regard to the use of a calculator, verbal reasoning, calculating in realistic and meaningful situations, using problem-solving strategies, and attitudes towards mathematics, are not included. Similarly, the language tests that pertain to the educational attainment targets for Dutch (reading comprehension and spelling) do also pertain to only two aspects of the educational attainment targets. The educational attainment targets for Dutch also pertain to listening and talking skills, writing (not just spelling), the use of strategies and reflection, linguistics, and attitudes.

The second kind of outcome variables pertained to academic engagement and motivation outcomes; school enjoyment, autonomous functioning, effort expenditure, autonomous motivation and controlled motivation. These are important educational outcomes, despite the fact that they are not explicitly included in the attainment targets. Student's academic motivation and engagement are important factors in explaining later school engagement success. They are related to dropout, success in higher education and eventually the tendency for lifelong learning (Lüftenegger et al. 2012). More importantly, they are related to general feelings of happiness and well-being (Ryan & Deci, 2000).

Besides the attainment targets of Dutch and mathematics, there is a variety of other goals that the Flemish government put forward for primary schools. There are the goals related to other contents (e.g. French, music, world orientation and physics), and cross-content goals such as learning to learn, social functioning and ICT. If we want to make inferences about whether alternative education improves student's chances for reaching the educational attainment targets, these contents need also to be examined in future research. It is possible that students in alternative schools perform higher on some of these attainment goals. Previous studies that indicated other aspects, such as the use of learning strategies

(Steenbergen, 2009), creative competencies (Beçancon & Lubart, 2008) and problem solving strategies (Esquivias Serrano, Gonalez Cantu, & Muria Vila, 2003) have found positive effects of alternative pedagogy.

3.2. CAUSAL EFFECTS WITH CORRELATIONAL DATA

The major weakness of the present dissertations' methodology is the correlational nature of the data. Because students were not randomly assigned to schools, it is difficult to draw strong conclusions about the effects of alternative education. Although some studies succeeded in doing experimental studies in educational effectiveness research (Lillard & Else-Quest, 2006), in Flanders it is generally impossible to randomly assign students to schools due to the pedagogical freedom of the parents. We tried to meet the need for making causal inferences by using two techniques. First, we tried to control for differences in student population. Depending on the study, we used up to 13 covariates and their interaction with growth, to take into account the differences between schools in student population. This approach limits the possibility that other confounding variables cause a false and misleading effect of alternative education of student outcomes. Second, the present dissertation focussed on learning gains in achievement and development of engagement and motivation. Causal effects could be more strongly supported if no differences were found in initial level of the students, but in terms of the development over the school years. To tackle the issue of student mobility (see Chapter 1, 3.1.3), missing data imputation techniques were used.

3.3. VARIATION BETWEEN ALTERNATIVE SCHOOLS

The present dissertation examined alternative schools as one group. Freinet schools, Steiner/Waldorf schools, Jenaplan schools, life schools and experience-based schools were all included as being one group of alternative schools. The same is true for public and private alternative education. The choice for the examination of combined effects was twofold. First, we were inspired by the common child-centred pedagogy that characterizes all alternative schools (Van Heddegem et al., 2004; Verhaeghe & Gadeyne, 2004). The second reason was

more pragmatic. The alternative education landscape in Flanders is very fragmented (see Figure 1). Alternative schools are divided across five educational associations and eight different 'types' of alternative schools in terms pedagogical approach. There are too few schools in some categories.

However, one could also argue that such a combined approach gives an oversimplified image of alternative education. Specially given the fact that, besides the common child-centred pedagogy, alternative schools can differ on several aspects (Van Heddegem et al., 2004; Verhaeghe & Gadeyne, 2004). For example, Steiner/Waldorf schools scored generally lower on several scales related to alternative practices compared to other types of alternative schools (Freinet, Jenaplan, experience-based schools). Their different view on the development of children is probably linked to this result and to their specific objectives. Another example was the good achievement in reading comprehension of some sub-groups of alternative schools (de Bilde et al., 2012). Also in terms of learning gains in achievement and development of engagement, differences between alternative types of schools were found (de Bilde et al., 2012; Paas & Mulder, 2010). Further, also between similar alternative schools differences can be found (de Bilde et al., 2012).

Another concern associated with differences between alternative schools, concerns the fidelity of implementation of the alternative pedagogy, as well as the general quality of the school. Sometimes in Flanders low-quality schools, with a decreasing student population, become alternative schools to attract a more privileged student population (e.g., Jagers, 2009). This might be especially the case in a part of the public school system. This argument is one that we cannot evidence, but it could have influenced our results. This means that it is not necessarily the pedagogical approach that leads to maladaptive school outcomes, but rather the general quality of some schools.

4. CONTRIBUTIONS OF THE DISSERTATION

4.1. DISCUSSION ON CHILD-CENTRED VERSUS CURRICULUM CENTRED LEARNING

As mentioned in the introduction section, the effectiveness of these alternative practices has been under discussion. Although several practices have generally been associated with

positive outcomes effective (e.g., Guthree et al., 2004; Reeve, 2006; Stipek, et al., 1995), some authors have questioned the effectiveness of educational practices that are implicitly or explicitly based on the child-centred approach (Connor & Morrison, 2002; Mayer, 2004; Kirschner et al., 2006). In general, our results amplify the arguments of the opponents of child-centred education, as we evidenced that alternative education is generally disadvantageous for students' mathematic achievement, school engagement and motivation. In contrast to most studies in the field (e.g., Reeve, 2006), an autonomy-supportive teacher style, has been associated with smaller learning gains and even with lower school enjoyment (see Chapter 2).

However, the present dissertation also indicated that the discussion between proponents and opponents is too polarized. We evidenced that not all experiential practices were related to poor student outcomes. A stimulating teaching style was associated with higher learning gains in both language and mathematics achievement. Future research should identify the effective alternative practices, as well as the conditions under which these practices can be effective. For example, in Chapter 2 we reported a negative effect of autonomy-supportive teaching style despite evidence from other studies that autonomy-support is generally beneficial for achievement, motivation and engagement. Perhaps, the age of the participants (e.g., kindergartners versus college students) is an important factor in explaining why the results differ. Most studies reporting positive effects of autonomy support are among older students. A second possible condition is the type of test (e.g., basic skills such as mathematics achievement versus higher-order skills). As Muijs, Campbell, Kyriakides and Robinson (2005) argued, alternative practices are generally the least effective when basic skills are tested. Other conditions might include class characteristics that were not included in the present dissertation such as classroom structure, clarity of instruction, etc. It is very likely that a combination of practices leads to optimal results, rather than focussing on specific practices (Stipek, 2006). For example, scholars have argued that an autonomy-supportive teacher style is beneficial if accompanied with a sufficient amount of structure and discipline (Sierens, Vansteenkiste, Goosens, Soenens, & Dochy, 2009; Van Petegem, Aelterman, Van Keer & Rosseel, 2008; Vansteenkiste et al., 2012).

4.2. DISCUSSION ON DIFFERENTIAL EFFECTS

The discussion on differential effects is relevant for educational researchers, policy makers and practitioners. Differential effects were examined using cross-level interaction effects to examine if different students (in terms of initial achievement or SES) respond differently to certain teaching practices. Are such differential effects meaningful? Do they help us understand the complex reality, or do they make it just increasingly complex? In the present dissertation, three different variables were used to identify which students were at risk for school failure. The choice of variable to identify students at risk does impact the results with regard to differential effects. This means that SES, initial achievement and initial arithmetic achievement tap into different aspects that put students at risk. SES describes risk due to demographic and socio-economical risk factors, such as educational level of the parents, family income, etc. (Aikens & Barbarin, 2008). Initial language achievement describes to which extent children are able understand and learn from instruction, express themselves, etc. (Smart, Prior, Sanson, & Oberklaid, 2001). Mathematics achievement is related to abstract problem solving skills and higher order thinking skills (Duncan, et al., 2007; Smart, Prior, Sanson, & Oberklaid, 2001).

In both studies which used SES as a moderation variable (Chapter 2 and Chapter 4), the effect of alternative education did not differ between high and low SES students. Although some studies found evidence for differential effects while using demographic risk indicators such as SES (e.g., Hamre & Pianta, 2005), others found similar results to ours and indicated that especially functional risk indicators such as initial achievement are useful to disentangle differential effects (e.g., Sammons, Nuttall, & Cuttance, 1993). In Chapters 2, 3 and 4, initial language achievement is used as an indicator for differential effects, Chapters 2, and 5 included initial mathematics achievement. In Chapter 2 differential effects with regard to both initial language achievement and initial arithmetic achievement were examined, which allows us to compare the moderation effects with initial language and mathematics achievement. This dissertation indicated that initial language achievement modified the effect of autonomy-supportive teaching style. Initial arithmetic achievement tended to modify the effect of other educational practices: stimulating teaching style and the amount of time for (free) choice activities.

Sometimes when no main effects of alternative education were found (e.g., no main effect on students' effort expenditure), we found an effect among a particular group of students (e.g., only among low achievers a negative effect was found on effort expenditure). Although these kinds of effects make it difficult to say something about the general effects of alternative education, they might be especially meaningful if we want to make inferences about which educational practices might help us to increase the school success of disadvantaged students. These results could give directions to researchers, policy makers and teachers about the ways to increase at-risk students' performance and which specific practices to avoid. In our opinion, differential effects are certainly useful to examine which educational practices could compensate for the risk of school failure, and which educational practices could put at-risk children in even greater risk for school failure. Certainly given the 'equal opportunities for all' pact of the Flemish government ('Decreet betreffende de gelijke onderwijskansen', 2002), more studies should include differential effects, even if no main effects were found.

4.3. DISCUSSION ON EVIDENCE-BASED PRACTICE VERSUS PEDAGOGICAL FREEDOM

In Flanders, pedagogical freedom is highly valued among schools, teachers and parents. The pedagogical freedom is even mentioned in Belgium's constitution (Saveyn, 2009). Besides the government obliged educational attainment targets which could be considered as the minimum attainment goals, schools can autonomously decide which additional goals to strive for. This creates diversity in the educational landscape so that parents can choose the school that best fits their vision on education and learning. A second meaning of pedagogical freedom regards the process of education; schools are also free in deciding upon how to reach their goals. There is little input from the Flemish government in how schools should reach these attainment targets. The school inspectorate visits the Flemish schools to check whether the schools attain the targets set in their curriculum through inspection of learning plans, agenda's and curricula; but the inspectors cannot directly evaluate the schools' method or teaching style. From this perspective, schools are free to choose a specific educational method, even when this method leads to suboptimal learning outcomes in

students. This meaning of pedagogical freedom could be restricted by to the perspective of evidence-based practice (Davies, 1999). The idea behind evidence-based practice is that practitioners (schools and teachers) should mainly rely on educational practices that have been proven effective in educational research. Recently, evidence-based practice in education has been criticized as opponents argue that evidence might not play a determinative role. Opponents have argued for an evidence-informed approach in which the context, values, theories and opinions should also be taken into account in choosing the best practice in a specific educational context (Biesta, 2007; Nevo & Slonim-Nevo, 2011).

In our opinion, although pedagogical freedom of schools is an important value in Flemish education, the best interest of children should always prevail in any kind of philosophy or vision on education and learning. Schools, teachers, and parents should be at least informed and stimulated to use evidence-based practices. As we will make clear in the following paragraph, further research is certainly needed in determining the effects alternative approaches in education. However, if specific educational alternative practices consistently prove to be maladaptive for several school outcomes, alternative teachers and schools should have the courage to implement other evidence-based practices, even if they are in conflict with their pedagogical vision, because children need quality education.

5. REMAINING QUESTIONS

Our results indicate that alternative schools and alternative education face several challenges. First, there is the challenge of improving students' mathematics achievement. Second, there is a challenge to improve students' engagement and autonomous motivation for school. However, two important questions remain.

First, future studies should include other indicators of school functioning. This means on the one hand that future studies should incorporate a broader range of educational outcomes, such as social functioning, critical thinking, deep-level learning, lifelong learning skills. Future studies should also look into the long-term effects of alternative education. Chapter 5 has made a start by examining the academic engagement and motivation at the end of the first year in secondary education, but we can go further. How does the achievement of students

from alternative primary schools develop in secondary education? Do these students manage to catch up? What about the further development of motivation and engagement? Can alternative school prevent students to drop out of school? Although there are only a handful alternative secondary schools in Flanders, the question about the effects of alternative secondary schools is also relevant. Does alternative education in secondary schools answers more to the educational needs of the students in terms of autonomy, self-directedness, than alternative primary schools do (see Eccles, Midgley et al., 2003).

A second main question regards the teacher practices that might account for these differences between alternative and traditional schools. Although Chapter 2 described some features of experiential education, more research on the effects of alternative practices is needed in primary education. What exactly are the critical aspects that cause these differences between alternative and traditional schools? These studies can include other aspects, such as time on task, the amount of collaborative work, autonomy-supportive environment, etc. These studies are necessary to give directions to alternative schools and teachers to improve the school functioning of their students within an alternative context.

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