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Teachers' expectations and the achievement gap:

The role of students' ethnicity and socioeconomic status

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Sara Speybroeck, Teachers' expectations and the achievement gap: The role of students' ethnicity and socioeconomic status

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When people interact with others, they form expectations about what these others will say or do. These expectations can also have consequences as they can lead people to behave in ways that conform with the expectations. Such social interactions also occur within the domain of education. Teachers develop expectations for students' academic performance which could in turn have important consequences. Especially for students who are at risk for school failure such as ethnic minority students or students from lower socioeconomic backgrounds, the impact may be large.

Within the educational research field, numerous studies have investigated predictors and effects of teachers' expectations. Nevertheless, shortcomings in the existing knowledge base remain. In order to address some of these gaps, four studies are carried out that aimed at identifying important antecedents, consequences and moderators of teachers' expectations with respect to ethnic minority students and students from lower socioeconomic backgrounds in Flanders. All four studies are based on data from the large-scale longitudinal SiBO-project (Dutch acronym for Trajectories through Primary Education), comprising a representative cohort of approximately 4000 students followed from kindergarten until the end of sixth grade and beyond. Information is gathered on students' cognitive skills and on characteristics of their family, classroom and teacher. The effects of teachers' expectations are investigated both cross-sectional (i.e., in kindergarten) and longitudinally, across several grades in elementary school. Data are analysed by means of structural equation modeling and multilevel regression analyses.

By means of an integrated moderated mediation structural equation model, the first study reveals that teachers' expectations in kindergarten mediates the association between students' SES and their later language and math achievement, controlling for students' ethnicity, prior achievement and gender. Furthermore, students' ethnicity moderates this mediation effect of teachers' expectations with respect to math outcomes. The second study shows that teachers have higher expectations for girls and students with a higher SES than for boys and students with a lower SES, controlling for students' prior achievement. The multilevel regression analyses also demonstrate that the expectations are higher in classes with more low-SES students than in classes with more high-SES students. Furthermore, teachers expect more from minority students when these students belong to classes with a larger proportion of minority students than when these students belong to classes with a larger proportion of majority students. By using a latent sum and difference structural equation model, the third study shows that teachers' and parents' expectations in kindergarten are, both independently and congruently, associated with students' achievement, controlling for their prior achievement. These associations are most pronounced for children from lower socioeconomic backgrounds. Furthermore, if teachers and parents have differential expectations, the effect of the parents predominates. In the fourth study, the results of the longitudinal reciprocal structural equation model point towards direct effects of teachers' expectations on students' achievement within one school year and to indirect effects across several school years through a transfer of expectations of different teachers over time. The associations between expectations and achievement during elementary school do not differ for majority and minority students nor for different SES groups.

To conclude, teachers have differential expectations concerning their students in kindergarten and in elementary school. Furthermore, teachers' expectations in turn affect students' achievement outcomes. Although in general the effects are rather small, they become larger for students from lower socioeconomic backgrounds, when teachers' expectations match the expectations of parents and by means of a transfer of expectations of different teachers over time.

Sara Speybroeck, Leerkrachtverwachtingen en de prestatiekloof: De rol van etniciteit en de socio-economische status van leerlingen

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Mensen koesteren onvermijdelijk verwachtingen over wat de anderen zullen zeggen of doen. Deze verwachtingen zijn niet zonder gevolgen. Ze kunnen er voor zorgen dat anderen zich gedragen conform deze verwachtingen. Dit is ook het geval in de klas: leerkrachten hebben namelijk verwachtingen over de prestaties van hun leerlingen. Vooral als het gaat om leerlingen van allochtone afkomst of leerlingen met een lage socio-economische status (SES), kan de impact van de leerkrachtverwachtingen aanzienlijk zijn.

Binnen het onderwijskundige onderzoeksveld heeft men reeds verschillende studies uitgevoerd waarbij de determinanten en de effecten van leerkrachtverwachtingen zijn onderzocht. Het beschikbaar onderzoek vertoont evenwel een aantal tekortkomingen. Om aan deze tekortkomingen tegemoet te komen zijn er binnen dit doctoraat vier studies uitgevoerd die als doel hebben belangrijke antecedenten, gevolgen en moderatoren in kaart te brengen van leerkrachtverwachtingen ten aanzien van allochtone leerlingen en leerlingen met een lage SES in Vlaanderen. Deze studies zijn gebaseerd op data die zijn verzameld in de context van het grootschalige longitudinaal SiBO-project (i.e. Schoolloopbanen in het Basis Onderwijs). In dit project is een representatieve steekproef uitgevoerd betreffende ongeveer 4000 leerlingen vanaf de kleuterklas tot het einde van het zesde leerjaar en verder. Er is informatie verzameld over kenmerken en cognitieve vaardigheden van leerlingen, kenmerken van het gezin, de klas en de leerkracht. De antecedenten, gevolgen en moderatoren van leerkrachtverwachtingen zijn onderzocht zowel cross-sectioneel (i.e. in de derde kleuterklas) als longitudinaal, over verschillende schooljaren heen in het lager onderwijs. De data zijn geanalyseerd op basis van structurele vergelijkingsmodellen en multiniveau regressieanalyse.

Op basis van een geïntegreerd gemodereerd mediatiemodel is in de eerste studie aangetoond dat leerkrachtverwachtingen in de derde kleuterklas de associatie tussen de SES van leerlingen en hun latere prestaties voor taal en wiskunde mediëren. Bovendien verschilt dit mediatiemodel tussen allochtone en autochtone leerlingen met betrekking tot de prestaties voor wiskunde. De tweede studie geeft aan dat leerkrachten in de derde kleuterklas meer verwachten van meisjes en leerlingen met een hoge SES dan van jongens en leerlingen met een lage SES. De multiniveau regressieanalyses tonen ook aan dat de verwachtingen voor leerlingen hoger zijn indien de klas voornamelijk bestaat uit leerlingen met een lage SES; en dat de leerkracht meer verwacht van allochtone leerlingen indien ze in een klas zitten met een meerderheid van allochtone leerlingen. Door middel van een latent 'som en verschil'-model blijkt uit de derde studie dat leerkracht- en ouderverwachtingen in de derde kleuterklas zowel onafhankelijk als gezamenlijk bijdragen tot de prestaties van leerlingen. Leerlingen met een lage SES blijken het meest gevoelig te zijn voor de gecombineerde effecten. Wanneer leerkrachten en ouders verschillende verwachtingen hebben, primeren de verwachtingen van de ouders. De resultaten van de laatste studie wijzen op directe effecten van leerkrachtverwachtingen op de prestaties van leerlingen binnen één schooljaar alsook op indirecte effecten over verschillende schooljaren heen. Bij deze langetermijneffecten is er geen verschil tussen allochtone en autochtone leerlingen noch tussen de verschillende SES groepen.

Samenvattend kan men besluiten dat leerkrachten verschillende verwachtingen hebben ten aanzien van hun leerlingen zowel in de derde kleuterklas als in het lager onderwijs. Bovendien hebben deze verwachtingen ook gevolgen voor de latere prestaties van leerlingen. In het algemeen zijn de effecten klein, maar ze worden groter voor leerlingen met een lage SES; indien de leerkrachtverwachtingen overeenkomen met die van de ouders; en door middel van een transfer van verwachtingen van verschillende leerkrachten over de tijd.

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CHAPTER 1

General Introduction

1. Introduction

An important educational objective is to prevent academic failure for students who are at risk of negative school outcomes such as ethnic minority students or students from lower socioeconomic groups. These vulnerable students have been found to have lower achievement scores than ethnic majority students or students with a higher socioeconomic status (SES) and, nowadays, the achievement gap is still growing (Baird, 2012). One of the factors that may contribute to the achievement gap is the expectation of the teacher in the classroom (Weinstein, Gregory, & Strambler, 2004). Teachers may adhere to stereotypes thereby expecting less from ethnic minority students or students from lower socioeconomic backgrounds compared to ethnic majority students or students from higher socioeconomic backgrounds. That way, teachers may approach these students less positively, which in turn affects their later performance (McKown & Weinstein, 2008). Teachers thus may unintentionally exacerbate individual differences between students by means of their differential beliefs, attitudes, and behaviours in the classroom.

The present doctoral dissertation aims at identifying important antecedents, consequences and moderators of teachers' expectations with respect to ethnic minority students and students from lower socioeconomic backgrounds in Flanders. In this chapter, an overview of the empirical research concerning teachers' expectations is provided, followed by the research objectives and the research methodology of this doctoral dissertation. Finally, an overview of the remaining chapters is presented.

1.1. Teachers' Expectations Defined

When people interact with others, they form expectations about what these others will say or do. Such social interactions also occur within the domain of education (Snyder & Stukas, 1999). Teachers develop expectations for students' performance and skills. According to Dusek and Joseph (1983), the concept of 'teachers' expectations' could be operationalized in two ways. The authors defined 'social

expectations' as teachers' perceptions of students' general social development and their relations with peers and adults. 'Academic expectations' were conceptualized as teachers' perceptions of students' performance, achievement, ability and attainment. To form their expectations, teachers may use both objective and subjective information they have concerning their students (Trouilloud, Sarrazin, Martinek, & Guillet, 2002). The expectations, in turn, may guide teachers in their behaviour, (inter)actions and treatment of students and as a result, students' learning and their academic outcomes could become affected (Brophy, 1983).

The complex process of antecedents, consequences and moderators of teachers' expectations could be understood in the context of an ecological systems framework (Bronfenbrenner, 1986). According to this framework, students' academic progress may be supported or hampered by several proximal processes which are defined as reciprocal relations and interactions between the student and the immediate environment over time. In this immediate environment or microsystem, the most direct interaction take place. Important microsystems are the classroom context in which students interact with their teachers and the family context in which students interact with their parents. Furthermore, according to the ecological theory these different microsystems may also interact and influence students' outcomes independently as well as conjointly (mesosystem). For example, the relation between students and parents may have an impact on how students will interact with their teachers.

1.2. Antecedents of Teachers' Expectations

In a meta-analysis Dusek and Joseph (1983) reported some bases on which teachers form their expectations for students' performance. They concluded that teachers hold differential expectations for students differing on previous test scores, but also differing on physical attractiveness, conduct, race and social class. Teachers' expectations can thus depend on objective (e.g., early performance) or subjective (e.g., teachers' prejudices about students' ethnicity or social class) information (Trouilloud, Sarrazin, Martinek, & Guillet, 2002). Research has shown that, in

general, teachers expect more from children belonging to ethnic majority groups (e.g., white European/American) or children with a higher socioeconomic status (SES) than from children belonging to ethnic minority groups (e.g., African American) or children with a lower SES (Dusek & Joseph, 1983; Rubie-Davies, Hattie, & Hamilton, 2006; Tenenbaum & Ruck, 2007; Auwarter & Aruguete, 2008; Hinnant, O'Brien, & Ghazarian, 2009; de Boer, Bosker, & van der Werf, 2010; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010)

1.3. Consequences of Teachers' Expectations

Not only do teachers form expectancies regarding their students, these expectations could also have consequences. Research has described two ways in which teachers' expectations may relate to students' outcomes: students can conform to the teachers' expectations because these expectations are accurate or because they are self-fulfilling (Jussim, 1991; Trouilloud, Sarrazin, Martinek, & Guillet, 2002). When the expectations are entirely in line with reality, they cannot erroneously influence students' later performance. Only inaccurate expectations cause self-fulfilling prophecy effects (Jussim, 1989). For example, a teacher might think that a student with a low socioeconomic background will perform poorer than a student with a high socioeconomic background. This inaccurate idea causes a new behavior which brings the situation into conformity with the false belief (Merton, 1948). The teacher, for instance, might give the student of whom he or she has low expectations, less encouragement or less positive feedback, which eventually results in lower performance.

The self-fulfilling prophecy phenomenon is well known in sociology, social psychology and economics, but its influence was most pronounced and most controversial in education (Wineburg, 1987). In 1968, Rosenthal and Jacobson (1968) tested the influence of teachers' expectations on students' academic progress in a low-income elementary school. In their Pygmalion study, students were subjected to a nonverbal intelligence test (TOGA) at the beginning of the school year and the teachers were given false information about the intelligence level of the students. At

the end of the school year, the same intelligence test was administered. Results showed that students whose teachers expected a high increase of learning ability within the next year, seemed to have higher intelligence scores at the end of the school year. Although the validity of the study was criticized and although the results could not be replicated (Wineburg, 1987; Snow, 1995), the Pygmalion study led to an increasing interest in examining the effects of teachers' expectations in the classroom.

Since 1968, numerous studies have demonstrated an effect of teachers' expectations in various subject areas, such as in mathematics (Jussim, 1989; Jussim & Eccles, 1992; Madon, Jussim, & Eccles, 1997; Gill & Reynolds, 1999; Hinnant, O'Brien, & Ghazarian, 2009), in reading (Gill & Reynolds, 1999; Kuklinski & Weinstein, 2001; Rubie-Davies, Hattie, & Hamilton, 2006; Hinnant, O'Brien, & Ghazarian, 2009) and in sport education (Trouilloud, Sarrazin, Martinek, & Guillet, 2002; Trouilloud, Sarrazin, Bressoux, & Bois, 2006). Nevertheless, the effect found is rather small, with standardized regression coefficients ranging from of .10 to .30 (Jussim & Harber, 2005). Because of these small effects, the focus in research changed from investigating whether or not teachers' expectations predict students' outcomes to identifying when, where, and for whom it occurs (Trouilloud, Sarrazin, Bressoux, & Bois, 2006). For some groups of students or under certain conditions the effects may be large. These moderators will be discussed next.

1.4. Factors Shaping the Power of Teachers' Expectations

The effects of teachers' expectations may be larger for certain groups of students. For example, students who are at risk of negative school outcomes such as ethnic minority students or students from lower socioeconomic backgrounds may be more susceptible to the effects (Jussim, Eccles, & Madon, 1996; McKown & Weinstein, 2002; Hinnant, O'Brien, & Ghazarian, 2009). However, studies conducted in the Netherlands (de Boer, Bosker, & van der Werf, 2010; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010) contradicted the results found in the United States. In the Netherlands, students' ethnicity did not moderate the association

between expectations and achievement. Hence, the picture on possible interaction effects remains unclear.

A second factor that may shape the power of teachers' expectations is the influence of parents on their children's schooling outcomes. Students' academic development is a result of different factors. Not only the teachers' influences matter, also the parental influences are important. For example, research has shown that parents' expectations can have large effects on students' schooling performance (Halle, Kurtz-Costes, & Mahoney, 1997; Jacobs & Harvey, 2005; Neuenschwander, Vida, Garrett, & Eccles, 2007). From an ecological point of view (Bronfenbrenner, 1986), it is important to include these parental influences when studying the effects of teachers' expectations. Some authors have investigated the influences of both teachers' and parents' expectations on students' outcomes. Gill and Reynolds (1999) for instance, found that parental expectations emerged as a stronger predictor of students' outcomes than the expectations of teachers. These results are consistent with the conclusions of Ma (2001), but in contrast with these of Mistry, White, Benner and Huynh (2009). Mistry, White, Benner and Huynh (2009). investigated the simultaneous influence of mothers' and teachers' expectations and concluded that only the latter had an effect on youth's academic achievement. Nevertheless, the generalizability of the findings was restricted because the sample consisted of low-income students age 8 or older. Moreover, the study did not control for prior achievement, so the results are likely to be biased.

Third, the effects of teachers' expectations could also become more powerful when the expectations are transferred over time (Jussim & Harber, 2005; Madon, Willard, Guyll, Trudeau, & Spoth, 2006). Short-term small effects (e.g., within one school year) could then become larger over a longer period of time (e.g., across several school years). Accumulation over time takes place when the effect of teachers' expectations is stronger on students' distal outcomes than on their proximal outcomes (Madon, Willard, Guyll, & Scherr, 2011). Most studies that have examined the long-term effects of teachers' expectations however concluded that the expectations effects do not accumulate, but rather dissipate or stabilize over time (Hinnant, O'Brien, & Ghazarian, 2009; de Boer, Bosker, & van der Werf, 2010). Yet,

these studies investigated dyadic relations between teachers' expectations and students' outcomes. They did not recognize that expectations of teachers could be transferred across different teachers over time thereby still leading to powerful accumulation effects.

2. Research Objectives

Teachers' expectations have been an object of research for many decades. However, despite a substantial amount of empirical studies, there are still some gaps in the current teacher expectation research with respect to ethnic minority students or students from lower socioeconomic groups. Some of these gaps are addressed in the present doctoral research project. For an overview of the conceptual model used in the dissertation see Figure 1.

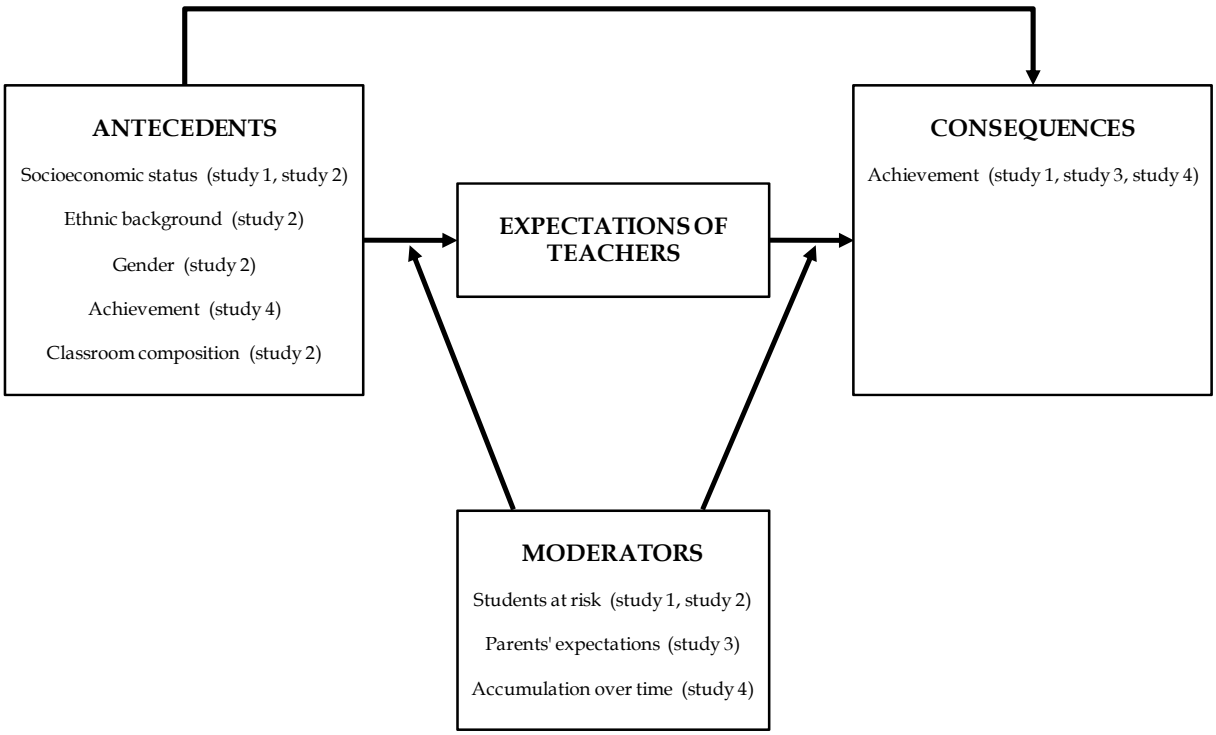

Figure 1. Conceptual model

First, although there are many studies investigating antecedents and consequences of teachers' expectations, no integrated model is available in which teachers' expectations function as a mediating factor between characteristics of vulnerable students and their performance. If, however, one wants to know whether or not teachers' expectations contribute to the achievement gap between at-risk and non-risk students, such an integrated model is warranted. Therefore, by means of a moderated mediation model, the first study of the doctoral dissertation examines the role of teachers' expectations in enlarging the achievement gap between students from low and high socioeconomic backgrounds in kindergarten. Furthermore, is questioned whether this mediation model differs between majority and minority students.

Second, the main focus in teacher expectation research has been on associations between individual characteristics of students at risk and the teachers' expectations. It is possible, however, that the expectations are also class-based rather than only student-based (Rubie-Davies, 2010). Interpersonal processes between students and teachers are embedded in the broader social context of the classroom (Bronfenbrenner, 1986). Until now, this class environment remains an understudied area within teacher expectations research. The goal of the second study is therefore to assess whether teachers form their expectations based on students' individual characteristics as well as on the socioeconomic, ethnic or gender composition of the class in kindergarten.

Third, research with respect to additional effects of parents' expectations is limited as most studies focused on either the expectations of teachers or the expectations of parents. The question whether teachers' and parents' expectations congruently and/or dissonantly influence the achievement of at-risk students remains unaddressed. In the third study, combined and differential associations of teachers' and parent's expectations and kindergartners' achievement are evaluated. Also possible differences in these associations between students from low and high socioeconomic backgrounds are examined.

A fourth gap in the teacher expectation research concerns the directionality of the long-term associations between teachers' expectations and students' outcomes.

Do teachers' expectations have long-term influences on students' outcomes and/or do students' outcomes influence the expectations of teachers across time? The directionality of the associations between teachers' expectations and students' performance as well as the processes by which these associations occur, have received little attention in literature. The fourth study determines the long-term reciprocal associations between teachers' expectations and students' mathematics achievement during elementary school. Further, it is tested whether the effects differ with respect to students' socioeconomic and ethnic backgrounds.

3. Methodology

3.1. SiBO Data

The data were collected in the context of a large-scale longitudinal survey in elementary education in Flanders (i.e., SiBO which is the Dutch acronym for Trajectories through Elementary Education) (Maes, Ghesquière, Onghena, & Van Damme, 2002). The project initiated in 2002 and intended to describe and explain inter-individual differences in students' developmental trajectories during kindergarten and elementary school. The SiBO project involved a random stratified sample of 122 schools which is representative for the entire Flemish school population in terms of the educational system, school size and geographic area (Verhaeghe, Maes, Gombeir, & Peeters, 2002). Furthermore, this dataset was extended with an oversampling of schools based on three criteria: (1) schools with a high percentage of specific groups of disadvantaged students, (2) public schools of the city of Ghent and (3) non-traditional schools. A representative cohort of approximately 4000 students was followed from kindergarten (age 5-6) until the end of sixth grade (age 11-12) and beyond. Information was gathered on children's cognitive and psychosocial skills and on characteristics of their family, classroom, teacher and school. Depending on the specific research objectives of each study presented in this doctoral project, different datasets were selected and build from the SiBO data.

3.2. Measures

In this paragraph, an overview is presented of the variables and the way they are measured in the studies of the doctoral project. All the measures yielded an adequate internal consistency. More information regarding the reliabilities can be found in the different chapters.

3.2.1. Achievement Tests

Curriculum-based achievement tests for language and math were constructed for each grade (Cortois, Van Droogenbroeck, Verachtert, & Van Damme, 2011). In kindergarten and in the first grade, the tests were administered once at the beginning and once at the end of the school year. From grade 2 on, children were administered the achievement tests only at the end of the school year. The language achievement test in kindergarten consisted of 40 items divided into five subtests: listening comprehension, sound and rhyme, auditory sequencing, literacy knowledge, and sound blending (Verachtert, 2003). The math achievement tests were especially constructed for use in the SiBO-project. In kindergarten, the test assessed skills in number sense such as comparing magnitudes, counting, and understanding mathematical concepts (Verachtert, 2003). The tests in elementary school also included items on mental arithmetic, number series, arithmetic word problems, measurement and geometry (Cortois, Van Droogenbroeck, Verachtert, & Van Damme, 2011). The raw scores were converted into scale scores with a common metric using Item Response Theory (Thissen & Wainer, 2001). That way, students' performance could be compared across different grades.

3.2.2. Students' Characteristics

Student characteristics like gender, socioeconomic status and ethnicity were based on data from the parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004). The variable gender was represented by a

dichotomous variable with a score of ''1'' for boys and ''0'' for girls. The socioeconomic status (SES) of the student was a standardized weighted measure and was composed of five indicators: the educational level of mother and father, the occupation of mother and father and the monthly household income (Reynders, Nicaise, & Van Damme, 2005). Parents' nationality at birth was used as an indicator of students' ethnic background. Students were classified into one of 2 categories: both parents have the Belgian nationality at birth and one of the two parents or both parents have a foreign nationality. The first category represented the group of ethnic majority or Belgian students, the second category represented the group of ethnic minority or non-Belgian students.

3.2.3. Group Composition Variables

Class composition variables based on students' gender, socioeconomic status and ethnicity were calculated by taking the class percentage of boys, the class mean socioeconomic status, and the class percentage of minority students. These variables were aggregated measures at the class-level from data at the child-level.

3.2.4. Teachers' Expectations

Teacher questionnaires administered in each grade were used to assess the teachers' expectations (Cortois, Speybroeck, Van Damme, & Verschueren, 2010). Teachers were given a questionnaire concerning each child in their classroom. Following the definition of 'academic expectations' of Dusek and Joseph (1983), the construct teachers' expectations used in the current doctoral project was composed of the following indicators, i.e., 'the child will be able to succeed in higher education', 'the child is performing better relative to his or her peers', 'the child is highly gifted' (not included in the third study) and the 'the child will need extra care in the future' (not included in the fourth study). These items correspond to the items used by various authors in expectation research (Jussim & Eccles, 1992; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).

3.2.5. Parents' Expectations

The parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004) was used to assess parental expectations. Parallel to the construct of teachers' expectations, the construct 'parents' expectations' was characterised by following indicators, i.e., 'my child will need extra care in the future', 'my child will be able to succeed in higher education' and 'my child is performing better relative to his or her peers'.

3.3. Data Analysis Strategy

To analyse the data, two main types of statistical analysis techniques were used, namely structural equation modeling (study 1, 3 and 4) and multilevel regression analysis (study 2).

Structural equation modeling (SEM) is a data analysis method incorporating many other traditional analysis techniques (Vigoda-Gadot & Yuval, 2003). In SEM, complex models can be fitted, which involve a number of linear equations and in which measurement error is accounted for in the dependent and the independent variables (Bollen & Long, 1993). Furthermore, it is possible to specify latent variable models that provide separate estimates of relations between the latent variables and their indicators (measurement model) and of the relations among the latent constructs (the structural model) (Tomarken & Waller, 2005). Another advantage is that the fit of alternative models can be evaluated comparatively. Finally, multiple group analyses make it possible to test whether models differ between different groups of students. In the third and fourth study of the doctoral project, two specific SEM models were tested, i.e., a latent sum and difference model and a reciprocal cross-lagged model. Parameter estimates and goodness-of-fit indices were computed using the Mplus software (Muthén & Muthén, 2011). Because our data contained missing values and deviated from normality, a robust maximum likelihood estimator (MLR) was employed. To account for the hierarchical structure of the data in the analyses (students are nested within classes and within schools), the identification

number of the classroom (study 1 & 3) and of the school (Study 4) of each child was used as a cluster variable. Model fit was assessed by the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI). Scaled chi-square difference tests were used to compare nested models.

In the second study of the doctoral dissertation, individual student characteristics as well as classroom features were investigated. Therefore, a multilevel regression model was implemented. Because students from the same class or school are more similar to one another, the individual data are not independent (students are nested within classes within schools). Multilevel regression analysis takes into account this hierarchical structural (Goldstein, 2010). With multilevel analysis it is possible to decompose the variance across the different levels. Furthermore, it is possible to include level-specific variables to explain variance at the different levels. A final advantage is that cross-level interactions or interactions between variables of different levels can be tested. In the second study, two levels were distinguished: the child-level and the class-level. The school-level was not taken into account because of the strong overlap between the number of classes and the number of schools. The analyses were built stepwise with increasing complexity for each successive model and they were performed with the software program MLwiN (Goldstein, 1995).

4. Outline of the Doctoral Dissertation

In the following paragraphs, an overview is presented of the remaining chapters of the doctoral dissertation. The chapters each consist of a manuscript that has been either accepted for publication or (re)submitted to an international peer-reviewed journal.

Chapter 2 investigates whether teachers' expectations mediate the association between students' socioeconomic status and their achievement outcomes in kindergarten. Furthermore, the role of students' ethnicity in moderating this mediated relation is assessed.

Chapter 3 deals with individual and classroom characteristics associated with teachers' expectations in kindergarten. More specifically, it is questioned whether the socioeconomic, ethnic and gender composition of the class is associated with teachers' expectations after accounting for the individual students' characteristics. Cross-level interactions are also evaluated.

Chapter 4 examines associations between teachers' and parents' expectations and kindergartners' end of year achievement. Possible moderation effects of students' socioeconomic status are addressed.

Chapter 5 stresses the long-term reciprocal associations between teachers' expectations and students' achievement during elementary school. Of particular interest are the differential effects of students' socioeconomic status and ethnicity.

Chapter 6 summarizes the main findings, discusses the implications and ends with some limitations and directions for future research.

CHAPTER 2

The Role of Teachers' Expectations in the Association between Children's SES and Performance in Kindergarten: A Moderated Mediation Analysis

Abstract

This study examines the role of teachers' expectations in the association between children's socioeconomic background and achievement outcomes. Furthermore, the role of children's ethnicity in moderating this mediated relation is investigated. In the present study, 3,948 children from kindergarten are examined. Data are analysed by means of structural equation modeling. First, results show that teachers' expectations mediate the relation between children's SES and their later language and math achievement, after controlling for children's ethnicity, prior achievement and gender. This result indicates that teachers may exacerbate individual differences between children. Second, children's ethnicity moderates the mediation effect of teachers' expectations with respect to math outcomes. The role of teachers' expectations in mediating the relation between SES and math outcomes is stronger for majority children than for minority children.

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1. Introduction

While interacting with students, teachers develop expectations for students' academic performance and social skills (Dusek & Joseph, 1983). The influence of these expectations has been the focus of debate for many decades (Jussim & Harber, 2005). Rosenthal and Jacobson (1968) were the first to study the effect of expectations on students' academic progress in a low-income elementary school. They concluded that students whose teachers expected a high increase of learning ability within the next year, indeed had higher intelligence scores at the end of the school year. Although the validity of the study was criticized (Thorndike, 1968; Snow, 1969), the Pygmalion study led to an increasing interest in examining the effects of teachers' expectations in the classroom.

1.1. Predictors of Teachers' Expectations

Research has shown that teachers base their expectations on both objective (e.g., students' past achievement) and subjective (e.g., teachers' prejudices) information [6]. Students' early performance and gender predicted teachers' expectations, with higher expectations for high achieving students and girls (Madon, Jussim, Keiper, Eccles, Smith, & Palumbo, 1998; Hinnant, O'Brien, & Ghazarian, 2009). According to some authors, expectations can also be based on students' social class and ethnicity (Dusek & Joseph, 1983; Hinnant, O'Brien, & Ghazarian, 2009; Auwarter & Aruguete, 2008; de Boer, Bosker, & van der Werf, 2010; Jussim, Eccles, & Madon, 1996). In general, studies show that teachers have lower expectations for minority students and students with a lower socioeconomic status (SES) than for majority students and students with a higher SES. However, other studies failed to find effects of social class and ethnicity (Madon, Jussim, Keiper, Eccles, Smith, & Palumbo, 1998; de Boer, Bosker, & van der Werf, 2010). According to Madon et al. (1998), teachers are more likely to base their expectations on students' achievement and motivation. Thus, results with respect to SES and ethnicity as predictors of teachers' expectations have been inconsistent. Furthermore, most studies have investigated the role of either

social class or ethnicity separately. This is problematic because these phenomena are closely related. On average, minority children have a lower SES than majority children (Jussim, Eccles, & Madon, 1996). In a study of Rubie-Davies, Hattie, and Hamilton (2006), both social class and ethnicity were included as predictors of teachers' expectations. In contrast to what was hypothesized, the authors found that teachers' expectations differed for students by ethnicity rather than by social class. Because currently no consensus exists about the way students' social class and ethnicity influence teachers, it would be interesting to examine further whether and how these child characteristics interact in predicting the teachers' expectations.

1.2. Effects of Teachers' Expectations

Not only do teachers form expectations regarding their students, these expectations may also relate to student outcomes. They can affect the teacher-student interactions in a manner that leads the student to fulfil the teachers' expectations (Trouilloud, Sarrazin, Bressoux, & Bois, 2006). A range of studies have demonstrated an effect of teachers' expectations in various subject areas, such as mathematics (Hinnant, O'Brien, & Ghazarian, 2009; Jussim, 1989; Jussim & Eccles, 1992; Madon, Jussim, & Eccles, 1997; Gill & Reynolds, 1999), reading (Hinnant, O'Brien, & Ghazarian, 2009; Gill & Reynolds, 1999; Kuklinski & Weinstein, 2001; Rubie-Davies, Hattie, & Hamilton, 2006) and sport education (Trouilloud, Sarrazin, Martinek, & Guillet, 2002; Trouilloud, Sarrazin, Bressoux, & Bois, 2006). However, the effect reported in the literature is rather small, ranging from r = .10 to .20 [2].

Because of these small effects, the focus in research has no longer been on the effect itself, but rather on identifying when and for whom it occurs (Trouilloud, Sarrazin, Bressoux, & Bois, 2006). In some situations, or for some people, the effects of expectations on students' outcomes are stronger. Jussim and Harber (2005) for instance, reported stronger effects early in the school year, when teachers were not yet familiar with their students. McKown and Weinstein (2002) investigated the role of ethnicity as a potential moderator of the relation between teachers' expectations and students' math and reading achievement. The authors found that children from

academically stigmatized groups (i.e., African American children) were more susceptible to the effect than the non stigmatized groups (i.e., Caucasian children). In the reading domain, Hinnant et al. (Hinnant, O'Brien, & Ghazarian, 2009) came to similar results. They found that teachers' expectations were more strongly related to later performance for minorities (non-White). In contrast, others failed to find a moderation effect of ethnicity (de Boer, Bosker, & van der Werf, 2010; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). In these studies, teachers' expectations did not interact with students' ethnicity in predicting students' performance.

1.3. An Integrated Model of Teachers' Expectations

In this paper we propose a structural equation modeling approach to examine whether teachers base their expectations on children's socioeconomic background and whether these expectations in turn affect children's language and math outcomes. Furthermore, the role of children's ethnicity in moderating these effects was investigated.

First, an integrated mediation model was tested in which teachers' expectations mediate the association between children's SES and outcomes after controlling for children's ethnicity, gender and previous language and math achievement scores. These control variables were chosen based on their relevance in predicting later children's achievement outcomes. In accordance with previous studies (Auwarter & Aruguete, 2008), we assumed that teachers would have higher expectations for children with a higher SES and lower expectations for children with a lower SES. Furthermore, teachers' expectations can affect later children's outcomes because of a differential treatment in the class (Jussim, Eccles, & Madon, 1996). Therefore, we expected that these higher/lower expectations (based on children's higher/lower socioeconomic background) in turn would lead to higher/lower achievement outcomes in language and math. In that way, teachers may exacerbate the achievement gap of children from different socioeconomic backgrounds (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).

Second, we examined whether the integrated mediation model would differ across majority and minority children. A moderated mediation model was tested, in which the strength of an indirect effect varies across the levels of the moderator (Baron & Kenny, 1986). As mentioned earlier, ethnicity plays a role both in the origination of teachers' expectations as in the effect of these expectations on later students' performance (Jussim, Eccles, & Madon, 1996; McKown & Weinstein, 2002). Given these results, it seems likely that ethnicity would also moderate the indirect effect of SES on children's outcomes through teachers' expectations. Because the presence of multiple vulnerabilities strengthened the direct associations in previous research, we assumed that the indirect association would also be stronger for minority than for majority children.

2. Methods

2.1. Ethics Statement

The data were anonymous, using publicly available secondary data.

2.2. Data

The data were collected in the context of the large-scale longitudinal SiBO-project (i.e., the Dutch acronym for School Careers in Elementary Education) (Maes, Ghesquière, Onghena, & Van Damme, 2002). The project initiated in 2002 and intended to describe and explain inter-individual differences in children's developmental trajectories throughout elementary school in Flanders (Dutch speaking part of Belgium). For that purpose, a cohort of approximately 4,000 students was followed from kindergarten (age 5–6) until the end of sixth grade (age 11–12) and beyond. The SiBO project involved a random stratified sample of 122 schools. Stratification was based on educational network and school size. The sample was representative for the entire Flemish school population in terms of the applied stratification criteria, the geographic area and the proportion of disadvantaged

students targeted by the Act of Equal Opportunities in Education (Verhaeghe, Maes, Gombeir, & Peeters, 2002). In these sampled schools, 3,949 children attended kindergarten during the school year 2002–2003. This group of children comprised the sample for the present study. At the start of that school year, children's average age was 5 years and 10 months. In Flanders, attending kindergarten is voluntary. Nevertheless, 99% of all the 4–5 year olds are going to kindergarten on a regularly basis (OECD, 2000).

2.3. Instruments

All the instruments that were used to operationalize the variables yielded adequate internal consistency, with Cronbach's alpha ranging from .83 to .93.

2.3.1. Standardized Language and Math Achievement Test

Language and math achievement was assessed at the beginning (September 2002) and in the end (May 2003) of the school year (Verachtert, 2003). The language achievement test consisted of 40 items divided into five subtests: listening comprehension, sound and rhyme, auditory sequencing, literacy knowledge, and sound blending (Buyse, Verschueren, Verachtert, & Van Damme, 2009). The math achievement test assessed skills in number sense such as comparing magnitudes, counting, and understanding mathematical concepts (Verachtert, Van Damme, Onghena, & Ghesquière, 2009).

2.3.2. Students' Characteristics

The students' characteristics gender, SES and ethnicity were based on data from a parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004). The variable gender was represented by a dichotomous variable with a score of ''1'' for boys (50.8%) and ''0'' for girls (49.2%). The latent construct SES represents the socioeconomic status of the child's family and

was composed of five items: the educational level of mother and father (rated on a 5-point Likert scale), the occupation of mother and father (rated on a 7-point Likert scale) and the monthly household income (rated on a 6-point Likert scale). Parents' nationality at birth was used as an indicator of ethnicity. Children were classified into one of 2 categories: both parents had Belgian nationality at birth (majority children 80.2%, coded as 0) and one of the parents or both parents had a foreign nationality (minority children 19.8%, coded as 1).

2.3.3. Teachers' Expectations

Teacher questionnaires were used to assess the teachers' expectations (Maes, 2003). In the middle of the academic year (February 2003), teachers were given a questionnaire in which they had to answer questions concerning each child in their classroom. The latent construct teachers' expectations in the current study covers 4 items: ''the child is highly gifted'' (rated on a 6-point Likert scale), ''the child will need extra care in the future'' (rated on a 6-point Likert scale and inversed), ''the child will be able to succeed in higher education'' (rated on a 4-point Likert scale) and ''the child is performing better relative to his or her peers'' (rated on a 3-point Likert scale). These items were chosen based on their correspondence to the items generally used in teacher expectation research. Dusek and Joseph (1983) defined academic expectations as teachers' perceptions of students' performance, achievement, ability and attainment. The first item covering teachers' expectations in our study (i.e., ''the child is highly gifted'') corresponds to one of the items used by Jussim and Eccles (1992) (i.e., ''how much natural mathematical talent does this student have?'') and to two of the items used by Van den Bergh et al. (2010) (i.e., ''he or she is a smart student'' and ''he or she is an intelligent student''). The second and third item covering teachers' expectations in the current study (i.e., ''the child will need extra care in the future'' and ''the child will be able to succeed in higher education'') provide a measure for teachers' perceptions of students' future performance and attainment. A comparable item is ''he or she will probably have a successful school career'' used by Van den Bergh et al. (2010) to measure

expectations. The fourth item (i.e., ''the child is performing better relative to his or her peers'') corresponds to another item used by Jussim and Eccles (1992) to assess teachers' expectations (i.e., ''compared to other students in this class, how well is this student performing in math?''). The internal consistency of our expectation scale was found to be good (Cronbach's alpha = .83).

2.4. Data Analysis Strategy

Data were analysed by means of Structural Equation Modeling (SEM). SEM is a data analysis method incorporating many other traditional analysis techniques (Vigoda-Gadot & Yuval, 2003). In SEM, complex models can be fitted, which involve a number of linear equations and in which measurement error is allowed in the dependent and the independent variables (Bollen & Long, 1993). Furthermore, it is possible to specify latent variable models that provide separate estimates of relations between the latent variables and their indicators (measurement model) and of the relations among the latent constructs (the structural model) (Tomarken & Waller, 2005). Another advantage described by Tomarken and Waller (2005) is that the fit of different alternative models can be evaluated comparatively. To account for the hierarchical structure of the data during analyses, the classroom identification number of each child was used as a cluster variable.

Parameter estimates and goodness-of-fit indices were computed using Mplus Version 3.0 (Muthén & Muthén, 2006) in combination with STREAMS Version 3.0 (Gustafsson & Stahl, 2005). Because our data contained missing values and deviated from normality at the univariate and multivariate level, a robust maximum likelihood estimator (MLR) was used, with the asymptotic covariance matrix as input. MLR estimations result in model parameter estimates and standard errors that are robust to missing data and violations of normality (Muthén & Muthén, 2007). To evaluate the size of the effects, Cohen's effect size index f^2 was used with $f^2 = 0.35$ indicating a large effect, $f^2 = 0.15$ a medium effect and $f^2 = 0.02$ a small effect (Cohen, 1992).

The models' goodness-of-fit were evaluated using a modified chi-squared statistic that is based on the Yuan-Bentler T2* test statistic (Y-Bχ^2) (Muthén & Muthén, 2007). Additional goodness-of-fit measures, such as the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI), were used to evaluate the models since the χ^2 measure is sensitive to sample size. According to Schermelleh-Engel, Moosbrugger, and Müller (2003), RMSEA and SRMR values of .05 or lower, and CFI values of .97 or higher indicate a good fit, while RMSEA and SRMR values between .05 and .08 and CFI values between .95 and .97 indicate an acceptable fit. The Satorra-Bentler-Scaled-χ^2-difference-test (ΔSBS-χ^2) was used to compare nested models.

The proposed mediation model, in which children's SES is related to children's language and math outcomes, was tested following different steps (cf. Holmbeck (Holmbeck, 1997). First, a model was fitted in which SES was related to children's outcomes after controlling for children's ethnicity, gender and prior language and math achievement (direct effect model). Second, the latent construct 'teachers' expectations' was included in the model (full model, see Figure 1). To test the mediation effect of teachers' expectations between children's SES and their later outcomes, the full model was compared to a model in which the direct path between SES and later achievement was constrained to zero. When these two models do not differ significantly from each other and when the initial significant relation between SES and outcomes is reduced to non-significant after the mediator is included, full mediation is shown. When a full mediation model is not confirmed, partial mediation can still be present (James, Mulaik, & Brett, 2006). Partial mediation is demonstrated when the direct effect is reduced, but still different from zero after the inclusion of the mediator (Gutiérrez-Doña, Lippke, Renner, Kwon, & Schwarzer, 2009).

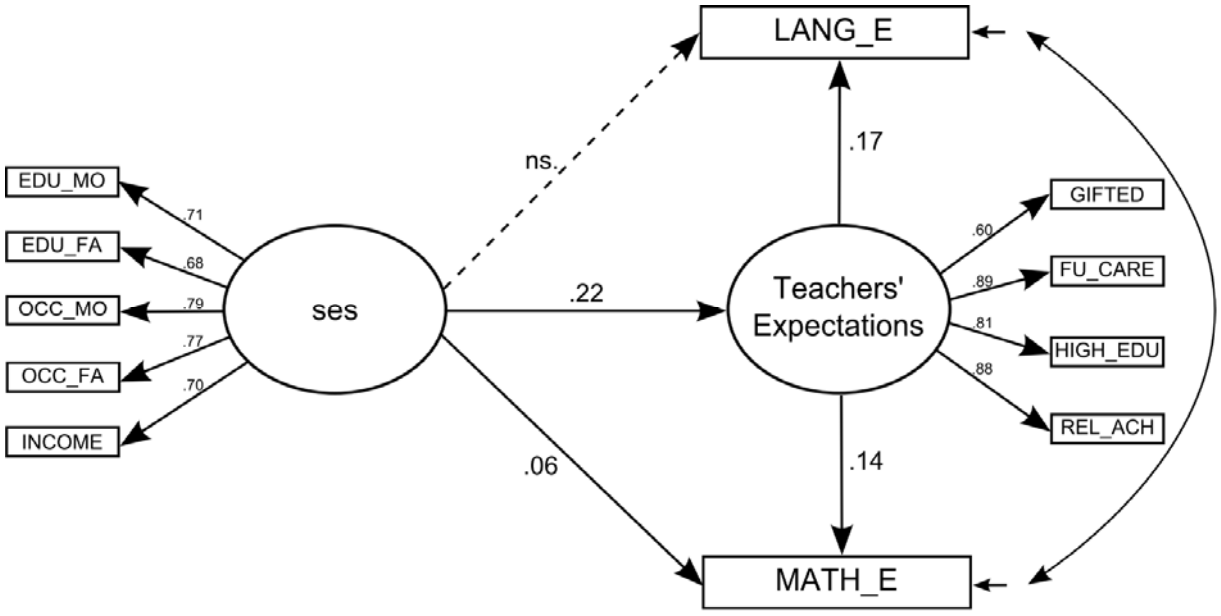

Figure 1. Mediation model of teachers' expectations. In this model, the residuals of the language and math achievement outcomes are allowed to correlate. For reasons of clarity, paths from the control variables (ethnicity, gender and prior language and math achievement) to later achievement are not shown. All coefficients are standardized. Except for the path ses-LANG_E, all coefficients are significant ($p < .001$). EDU_MO = education of the mother; EDU_FA = education of the father; OCC_MO = occupation of the mother; OCC_FA = occupation of the father; FU_CARE = future care; HIGH_EDU = higher education; REL_ACH = relative achievement; LANG_E = language achievement at the end of the school year; MATH_E = math achievement at the end of the school year.

To examine whether the structural paths and mediation effects were different for majority and minority children, multi-group modeling was used. With this technique the fit of a constrained model, in which all the structural coefficients of the model are set equal across groups, is compared with the fit of a more unconstrained model, in which some of the coefficients are allowed to vary across the groups. A significant scaled-χ^2-difference-test implies that there is a significant difference between the two groups (Gustafsson & Stahl, 2000). To test whether the indirect effect differs between majority and minority children (moderated mediation), a few procedures have been recommended in the literature (Lau & Cheung). One of the approaches involves adding a nonlinear constraint in the model. This means that the two different mediation effects that are being compared, are constraint to be equal

across the groups. The constrained and unconstrained models are then compared using the Wald chi-square test. This test is conducted by dividing the product of the direct effects (i.e., the indirect effect) by its standard error and comparing the result to a standard normal distribution (Little, Card, Bovaird, Preacher, & Crandall, 2007). A statistically significant Wald test indicates that the indirect effects are significantly different between the two groups. It should be noted that this approach is equivalent to the subgroup approach described by Edwards (Edwards & Lambert, 2007). However, in contrast to most studies in which the structural paths are analysed separately, we analyse moderated mediation by using the product term of the different mediation paths.

3. Results

3.1. Descriptive Statistics and Correlations

The descriptive statistics are presented in Table 1. Correlations among the indicators are, with the exception of several gender correlations, all significant and mostly positive (see Table 2).

Table 1. Descriptive Statistics

Measure	**Min.**	**Max.**	**M**	**SD**	**%**
LANG_B	13.89	69.56	44.42	10.36	
MATH_B	16.27	61.44	43.22	9.57	
LANG_E	17.52	71.80	52.06	9.31	
MATH_E	25.54	67.98	51.56	8.88	
EDU_MO	1	7	4.44	1.77	
EDU_FA	1	7	4.47	1.65	
OCC_MO	1	5	3.24	1.02	
OCC_FA	1	5	3.28	1.05	
INCOME	1	6	3.01	1.14	
GIFTED	1	6	2.35	1.24	
FU_CARE	1	6	3.93	1.55	
HIGH_EDU	1	4	2.78	0.91	
REL_ACH	1	3	2.24	0.77	
GENDER (boy)					50.80
ETHNICITY (minority)					19.80

Note. LANG_B = language achievement at the beginning of the school year; MATH_B = math achievement at the beginning of the school year; EDU_MO = education of the mother; EDU_FA = education of the father; OCC_MO = occupation of the mother; OCC_FA = occupation of the father; FU_CARE = future care; HIGH_EDU = higher education; REL_ACH = relative achievement; LANG_E = language achievement at the end of the school year; MATH_E = math achievement at the end of the school year.

Table 2. Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	LANG_B														
2	MATH_B	.76**													
3	GENDER	-.07**	-.01												
4	ETHNICI	-.30**	-.33**	-.02											
5	EDU_MO	.25**	.31**	.01	-.14**										
6	EDU_FA	.30**	.34**	.01	-.24**	.46**									
7	OCC_MO	.31**	.38**	.01	-.23**	.47**	.58**								
8	OCC_FA	.25**	.29**	.04*	-.12**	.61**	.40**	.62**							
9	INCOME	.29**	.35**	.03	-.25**	.54**	.48**	.52**	.49**						
10	GIFTED	.39**	.44**	-.01	-.12**	.23**	.21**	.25**	.24**	.25**					
11	FU_CARE	.55**	.59**	-.11**	-.15**	.26**	.27**	.30**	.25**	.27**	.46**				
12	HIGH_ED	.57**	.62**	-.07**	-.16**	.37**	.37**	.41**	.36**	.38**	.56**	.71**			
13	REL_AC	.57**	.61**	-.07**	-.11**	.27**	.28**	.31**	.27**	.27**	.53**	.73**	.79**		
14	LANG_E	.71**	.70**	-.08**	-.24**	.23**	.28**	.30**	.23**	.28**	.37**	.52**	.57**	.54**	
15	MATH_E	.71**	.85**	.02	-.33**	.30**	.35**	.39**	.31**	.37**	.42**	.58**	.62**	.60**	.74**

Note. LANG_B = language achievement at the beginning of the school year; MATH_B = math achievement at the beginning of the school year; EDU_MO = education of the mother; EDU_FA = education of the father; OCC_MO = occupation of the mother; OCC_FA = occupation of the father; FU_CARE = future care; HIGH_EDU = higher education; REL_ACH = relative achievement; LANG_E = language achievement at the end of the school year; MATH_E = math achievement at the end of the school year; ** $p < .01$; * $p < .05$.

3.2. Measurement Model

A confirmatory factor analysis was conducted with eight latent variables and 15 indicators. The latent construct SES was indexed by 5 indicators, i.e., 'education of the mother', 'education of the father', 'occupation of the mother', 'occupation of the father' and 'family income'. The construct teachers' expectations was covered by 4 indicators, i.e., 'gifted', 'future care', 'higher education' and 'relative achievement'. Ethnicity, gender and achievement for language and math (prior and later) were each represented by a single indicator with the error variance fixed to zero. Estimation of the measurement model indicated a good fit (Y-Bχ^2 (68) = 741.68; RMSEA = .05; SRMR = .03; CFI = .97). The standardized factor loadings ranged from .60 to .89. Correlations between the latent constructs showed that SES was significantly related to teachers' expectations (r = .52, p < .001), later language achievement (r = .39, p < .001) and later math achievement (r = .49, p < .001). Furthermore, teachers' expectations was significantly related to later language achievement (r = .64, p < .001) and later math achievement (r = .70, p < .001). All other variables were significantly correlated (ranging from r = .07 to .85, p < .001), except for the correlations of gender with SES, ethnicity and prior language and math achievement.

3.3. Mediation Models

The first, direct model, in which SES was related to children's language and math outcomes, demonstrated an acceptable fit to the data (Y-Bχ^2 (29) = 581.64; RMSEA= .07; SRMR = .03; CFI = .96). Children's SES was significantly associated with later language (β = .04, p < .05, f^2 = .002) and math (β = .09, p < .001, f^2 = .01) outcomes, even after controlling for children's ethnicity, gender and prior achievement. It should be noted that in terms of magnitude, the effect of SES was quite small. Nevertheless, even small effects can have a large impact on children's outcomes if they accumulate over time (Jussim & Harber, 2005; Jussim, 1989; Hughes, Gleason, & Zhang, 2005; Blackwell, Trzesniewski, & Dweck, 2007).

The full model, in which the construct 'teachers' expectations' was included, is presented in Figure 1. This mediation model yielded a good fit (Y-Bχ^2 (69) = 804.66; RMSEA = .05; SRMR = .03; CFI = .96). Next, the mediation effect of teachers' expectations between SES and later outcomes was tested separately for language and math outcomes. First, for language, the full model was compared to a model in which the path from SES to language achievement was constrained to zero. This constrained model also had a good fit (Y-Bχ^2 (70) = 799.92; RMSEA = .05; SRMR = .03; CFI = .96), but the χ^2-value became smaller. Performing a SBS-χ^2-difference test would thus result in a negative χ^2 statistic. Such an outcome is possible and indicates that the two models are very close in fit (Satorra & Bentler, 2010; Marshall, Miles, & Stewart, 2010). We therefore conclude that constraining the path between SES and language achievement does not worsen model fit. Moreover, the initially significant association between SES and language achievement (β = .04, p < .05, f^2 = .002) was reduced to non-significant (β = .00, p = ns., f^2 = .000). These results indicate that teachers' expectations fully mediated the association between children's SES and their language achievement scores. Higher SES was significantly associated (β = .22, p < .001, f^2 = .05) with higher teachers' expectations, which in turn were significantly associated (β = .17, p < .001, f^2 = .03) with higher language outcomes at the end of the school year.

Second, to test the mediation effect of teachers' expectations between SES and math achievement, the full model was also compared to a model in which the path from SES to later math achievement was constrained to zero. Constraining this path did significantly worsen model fit (ΔSBS-χ^2 (1) = 12.84, p < .001). This indicates that the direct path between SES and math achievement should be included in the model, thus rejecting a full mediation effect of teachers' expectations. Nevertheless, the reduction in the size of direct association after the mediator was included in the model, pointed to partial mediation. Thus, SES was positively associated (β = .22, p < .001, f^2 = .05) with teachers' expectations, which in turn were positively associated (β = .14, p < .001, f^2 = .02) with math outcomes at the end of the school year. In addition, a higher SES was also directly associated with higher later math outcomes (β = .06, p < .001, f^2 = .004).

3.4. Moderation Models

To examine whether children's ethnicity moderated the mediated effect of teachers' expectations between children's SES and achievement, a moderated mediation model was fitted. As mentioned above, moderated mediation was tested by comparing a model in which the mediation effect was constrained to be equal across the majority and the minority group, with a model in which the mediation effect was allowed to vary across both groups. Results indicated that for language, the fit of the fully constrained model did not significantly differ from the fit of the more unconstrained model in which the mediated effect was allowed to vary across the groups (ΔSBS-χ^2 (1) = 3.11, p = ns.). This indicates that children's ethnicity did not moderate the fully mediated effect of SES on language achievement through teachers' expectations. For math achievement, the fit of the fully constrained model significantly differed from the fit of the unconstrained model (ΔSBS-χ^2 (1) = 12.93, $p < .001$). This suggests that the partially mediated effect of SES on math outcomes through teachers' expectations significantly differed for majority and minority children. Looking at the standardized regression coefficients, this mediated effect is slightly stronger for majority (β = .04, f^2 = .002) than for minority (β = .02, f^2 = .0004) children.

To further examine which specific paths of the mediated effect for math differed between majority and minority children, additional multi-group analyses were performed. First, we examined whether ethnicity moderated the association between SES and teachers' expectations. Results demonstrated that the fit of the fully constrained model significantly differed from the fit of the more unconstrained model in which the path between SES and teachers' expectations was allowed to vary across groups (ΔSBS-χ^2 (1) = 5.89, $p < .05$). This indicates that there was a difference between majority and minority children concerning the association between SES and teachers' expectations, with a stronger association for majority children (β = .24, f^2 = .06) than for minority children (β = .14, f^2 = .02). Second, the fully constrained model was also compared to a model in which the path between teachers' expectations and math outcomes was allowed to vary across groups. Results showed significantly different fits between both models (ΔSBS-χ^2 (1) = 20.62, $p < .001$). The association

between teachers' expectations and math achievement was different for majority and minority children. The effect of teachers' expectations seemed to be somewhat stronger for majority (β = .16, f^2 = .03) than for minority children (β = .11, f^2 = .01).

4. Discussion

The purpose of this study was to test an integrated mediation model in which children's socioeconomic background is associated with their later language and math outcomes through teachers' expectations. Furthermore, the role of ethnicity in moderating these associations was examined. First, findings revealed that teachers' expectations mediate the relation between children's SES and later language and math achievement, after controlling for children's ethnicity, prior achievement and gender. Second, children's ethnicity moderated the mediation effect of teachers' expectations with respect to math outcomes. These findings will be discussed in more detail in the following sections.

4.1. Socioeconomic Background and Teachers' Expectations

Research has indicated that children's socioeconomic back-ground plays a significant role in predicting teachers' beliefs and expectations. In general, teachers have lower expectations for children from lower socioeconomic backgrounds (Dusek & Joseph, 1983). Results of the current study confirmed these findings. Kindergarten teachers in our study judged children with higher SES as more favourably than children of lower socioeconomic backgrounds over and above children's ethnicity, gender and prior achievement (β = .22, f^2= .05). Furthermore, the current study extended previous research by investigating interaction effects of children's SES with ethnicity in predicting teachers' expectations. In contrast to what we expected, the association between SES and expectations was stronger for majority children than for minority children. Results showed that for majority children, teachers were more inclined to base their expectations on the SES of the child. For minority children, teachers made less distinction between high and low SES levels. A possible explanation for this

result may be that most kindergarten teachers in our sample are from the ethnic majority group themselves (Siongers, Vangoidsenhoven, Kavadias, & Glorieux, 2009) and consequently they pay less attention to (more subtle) SES differences of minority children than to SES differences of children from the same ethnic background.

4.2. Teachers' Expectations and Achievement

Teachers' expectations in our study predicted children's language and math achievement at the end of the school year. This result concurs with previous studies concerning teacher expectation effects (Jussim & Eccles, 1992; Gill & Reynolds, 1999; Hinnant, O'Brien, & Ghazarian, 2009). However, the size of the effects (f^2 = .03 for language f^2 = .02 for math) is smaller than the average effect of r = .10 to .20 found in prior research [2]. Therefore, it is important to interpret the results accordingly and not to overestimate their significance. Nevertheless, as mentioned previously, several authors have argued that even small effects can have a large impact on children's outcomes if these effects accumulate over time (Jussim, 1989; Jussim & Harber, 2005; Hughes, Gleason, & Zhang, 2005; Blackwell, Trzesniewski, & Dweck, 2007).

When looking at the difference between majority and minority children for the effect of teachers' expectations on children's math outcomes, a moderation effect was found. However, in contrast to our hypothesis, the effect was larger for majority than for minority children. Majority children seem to be more susceptible to the teachers' expectations than minority children. This could indicate that the expectations, based on children's socioeconomic background, are of lesser importance for minority children than originally thought (Rubie-Davies, Hattie, & Hamilton, 2006). A positive consequence for these children is that lower teachers' expectations do not automatically lead to lower performance. On the other hand, minority children can take less advantage of the positive consequences of higher teachers' expectations. Again, this result can be explained by the fact that most teachers in Flanders belong to the ethnic majority group. Possibly, the teachers are better at engaging in stimulating interactions with majority children (Saft & Pianta, 2001). They might be

better at encouraging and praising children with a similar ethnic background as their own.

4.3. An Integrated Model

Results of our integrated model showed that teachers' expectations fully mediated the association between children's SES and language outcomes and partially mediated the association between SES and math outcomes. These results suggest that teachers base their expectations on children's SES and these expectations in turn affect children's later outcomes. Teachers have lower/higher expectations for children from lower/higher socioeconomic backgrounds and these expectations lead to lower/higher achievement, even after controlling for children's prior achievement, gender and ethnicity. Thus, the expectations of teachers can be seen as one of the possible links between children's SES and their outcomes. That is, the effect of socioeconomic background on achievement is at least in part due to teachers' expectations. Teachers may play a role in exacerbating existing individual differences between children [45]. This finding is an illustration of the ''Matthew effect'' (Merton, 1968). The effect refers to a process of cumulative advantage or disadvantage following initial advantage or disadvantage (Morgan, Farkas, & Hibel, 2008). Children with a lower socioeconomic background arrive at kindergarten with lower levels of competence due to family circumstances (Farkas, 2003). In turn, these children are less rewarded for their knowledge (Walberg & Tsai, 1983) and more impeded by their teachers (Scarborough & Parker, 2003) than children with a higher socioeconomic background. As a result, lower socioeconomic back-ground children tend to fall even further behind over time (Farkas, 2003).

Another finding of this study is that children's ethnicity moderated the mediation relation of teachers' expectations between children's SES and math outcomes. In contrast to what we expected, the effect was slightly stronger for majority than for minority children. It thus seems that children from minority and majority backgrounds are affected differently by the expectations of teachers that exacerbate the actual individual SES differences between children in kindergarten.

4.4. Limitations and Future Research

The results in our study need to be understood in the context of some limitations.

First, it should be noted that the cross-sectional design of the study does not allow to draw causal inferences. In the current study, teachers' expectations functioned as a predictor of children's outcomes. However, the relation between teacher and student likely reflects rather a bidirectional than a unidirectional process (Rubie-Davies, 2006). It is not only the teacher who influences the student or the student who influences the teacher, teacher and students mutually influence each other. In order to address these findings, cross-lagged panel research is needed.

Second, it is always possible that other factors that were not assessed in the current study, may affect predictors and outcomes (omitted variable problem). This study has focused on student characteristics predicting teachers' expectations. However, it is possible that these expectations are class centered rather than student centered (Rubie-Davies, 2010). Teachers may have expectations for their entire class and classroom characteristics may predict these expectations (McKown & Weinstein, 2008). Furthermore, the way that teacher background characteristics predict their expectations, remains understudied. Do teachers base their expectations on students' background characteristics or do their own views and experience also matter? Future research is important to assess these findings furthermore.

A third limitation is that the teacher expectation literature contains no agreed-on items for measuring expectations. This possibly follows from the fact that expectations are not uniquely defined. In an attempt to overcome this, we have included items that have been used by various authors before. Although we found the items in our study to probe a single underlying construct (Cronbach's alpha = .83), the lack of an unique operationalization for teachers' expectations hinder the generalizability and comparability with other studies in the domain.

A final limitation of the study concerns the timing of the measurement of teachers' expectations. The expectations were not measured at the beginning but in the middle of the academic year (February 2003). Therefore, the perceptions of the teacher could already be formed by daily interactions with the children. However, as

teachers use prior achievement to form their expectations, any interaction between the teacher and the child may lead to an underestimate of the effect of teachers' expectations. This because the model attributes some of the effect of expectations on later achievement to prior achievement.

5. Conclusion

Taken together, the findings in this study suggest that teachers play a role in enlarging existing socioeconomic background differences between children, with differential effects for majority and minority children.

CHAPTER 3

Teachers' Expectations and Classroom Composition: A Multilevel Analysis

Abstract

We examined the role of child and classroom composition characteristics associated with teachers' expectations in kindergarten (n = 1,883). Teachers had higher expectations for girls and children with a higher SES, controlling for prior achievement. Expectations were also higher in low-SES classes and for non-Belgian children in classes with a larger proportion of non-Belgian children. The findings suggest that teachers base their expectations on prejudiced information, at least concerning gender and SES. Non-Belgian children do not seem to be disadvantaged by their teachers. The results highlight the importance of simultaneously considering child and classroom predictors in teacher expectation research.

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1. Introduction

While interacting, teachers develop expectations of their students' academic performance (Dusek & Joseph, 1983). The possible impact of these expectations on students' later outcomes has been the focus of debate for many decades (Jussim & Harber, 2005). In some situations, or for some people, the effects tend to be strong. For example, teachers' expectations have been shown to have a substantial impact on the academic outcomes of ethnic minority children (McKown & Weinstein, 2002) and children from a lower socioeconomic background (Auwarter & Aruguete, 2008). Given the possible large impact of these expectations for certain children, it is important to understand how such expectations are being formed. Studies have shown that teachers base their expectations on objective (e.g., students' earlier performance) or subjective (e.g., teachers' prejudices concerning students' socioeconomic status) information (Trouilloud, Sarrazin, Martinek, & Guillet, 2002). Nevertheless, most teacher expectation research has focused on individual child characteristics associated with the teachers' expectations. It is possible, however, that the expectations are also class-based rather than only student-based (Rubie-Davies, 2010). As the ecological systems theory of Bronfenbrenner posits (Bronfenbrenner, 1986), interpersonal processes between students and teachers are embedded in a broader social context (a.o., the classroom). Both students and teachers bring their individual characteristics into the classroom and these characteristics inevitable influence the interactions between students and teachers and between students mutually. Therefore, teacher expectation research should focus more on the whole class environment than solely on the proximal behaviours between teachers and students (Rubie-Davies, 2009). In the current study we explicitly investigate individual as well as classroom predictors of teachers' expectations by means of a multilevel modelling approach. We argue that teachers not only base their expectations on prejudiced information about young children but that they also use classroom composition characteristics to form their expectations. Moreover, we contend that the child and classroom characteristics contribute not only independently, but also jointly, to the expectations of teachers.

1.1. Background

1.1.1. Child Characteristics and Teachers' Expectations

Several studies have examined associations between individual student characteristics and teachers' expectations. A meta-analysis (Dusek & Joseph, 1983) revealed that teachers base their expectations on students' social class and ethnicity, but not on students' gender. Teachers had higher expectations for children belonging to ethnic majority groups (e.g., white European/American) and children with a higher socioeconomic status (SES) compared to children belonging to ethnic minority groups (e.g., African American) and children with a lower SES. Tenenbaum and Ruck (2007) came to similar conclusions. Teachers expected more from European American students than from African American and Latino students. However, in a study by Madon et al. (1998) social class and ethnicity did not predict the teachers' expectations. The authors argued that teachers were more likely to base their expectations on students' achievement and motivation than on students' socio-demographic background. Auwarter and Aruguete (2008) did find an effect of gender, but only in interaction with the student's SES, revealing that teachers had higher expectations for high-SES boys than for low-SES boys, while, surprisingly, low-SES girls were rated more positively than high SES-girls. Hinnant, O'Brien, and Ghazarian (2009) also reported that boys' reading ability in Grade 1, 3, and 5, and their math ability in Grade 5 were underestimated by the teacher. In addition, ethnicity was also a significant predictor, but only in the final grade.

Research on prejudiced teachers' expectations has not only been carried out in the United Stated but also in other countries such as New Zealand and the Netherlands. In New Zealand, Rubie-Davies, Hattie, and Hamilton (2006) included both social class and ethnicity as predictors of teachers' expectations and found that the expectations of elementary school teachers differed for students by ethnicity rather than by social class. In the Netherlands, van den Bergh, Denessen, Hornstra, Voeten, and Holland (2010) similarly concluded that teachers in elementary school hold lower expectations for minority children than for majority children.

Furthermore, the higher the negative teacher attitude, the larger the difference between higher and lower teachers' expectations towards the two groups. On the other hand, de Boer, Bosker, and van der Werf (2010) could not find a significant effect of students' ethnicity, but the SES of the students predicted the teachers' expectations. The sample in this study, however, did not consist of elementary school children but of children age 12 or older.

Taken together, although several researchers have investigated associations between individual student characteristics and teachers' expectations, the results have been mixed.

1.1.2. Classroom Composition and Teachers' Expectations

So far, most teacher expectation research has focused on individual child characteristics associated with teachers' expectations without taking into account the broader social context of the classroom. Some studies have considered whole class factors when studying expectation effects but these studies have been focusing on teacher characteristics (Rubie-Davies, 2007; 2010; 2012) without explicitly addressing specific classroom characteristics such as the composition of the classroom. McKown and Weinstein (2008) examined the effects of classroom composition by student's ethnicity and they concluded that, overall, teachers have higher expectations in ethnically high-diverse classrooms than in ethnically low-diverse classrooms. Furthermore, a differential effect of students' ethnicity emerged. In classrooms with more ethnic diversity, teachers had higher expectations for European American and Asian American students than for African American and Latino students. In low-diverse classrooms, teachers' expectations did not differ between the two groups. However, other composition factors such as the SES level or gender composition of the classroom were not considered. Also Diamond, Randolph and Spillane (2004) investigated composition effects of teachers' expectations but the authors focused on school composition rather than class composition. Using semi-structured interviews and observations the authors argued that the expectations were patterned by the ethnicity and social class composition of the school. In schools with a higher

concentration of low-income and African American students, the expectations were lowered. Likewise, Rubie-Davies, Flint and McDonald (2012) explored the relationship between the socioeconomic level of the school and the expectations of teachers but no significant association was found.

In sum, with the exception of the research by McKown and Weinstein (2008), most studies investigating composition effects and teachers' expectations have been focusing on school factors rather than on classroom factors (Diamond, Randolph, & Spillane, 2004; Rubie-Davies, Flint, & McDonald, 2012). Furthermore, these studies only explored socioeconomic or ethnic composition effects. As far as we know, no studies have examined gender composition in relation to the teachers' expectations.

1.2. The Present Study

This study aims to extend the existing knowledge on predictors of teachers' expectations by simultaneously examining the impact of individual and classroom features on teachers' expectations in kindergarten. Given that expectations in early grades are known to influence children's future achievement scores (Jussim & Harber, 2005), it is important to understand factors that may impact the teachers' expectations as early as kindergarten.

First, this study further investigates whether children's gender, SES, and ethnicity predict the teachers' expectations in kindergarten, controlling for prior language and math achievement. These control variables were chosen because they are known to have a substantial influence on teachers' expectations (Jussim & Harber, 2005). Because teachers generally have been found to have lower expectations for children who are member of at-risk groups (Jones, Miron, & Kelaher-Young, 2012), it is hypothesized that teachers' expectations are higher for girls, for children from a higher socioeconomic background, and for Belgian children compared to the expectations for boys, children from a lower socioeconomic background, and non-Belgian children.

Second, it is examined whether the classroom composition based on children's gender, SES and ethnicity predict the teachers' expectations after accounting for prior

achievement and the individual child characteristics. Parallel to the findings obtained for school composition effects (Diamond, Randolph, & Spillane, 2004), we hypothesize that expectations will be higher in classrooms with a larger proportion of Belgian children and children with a high SES than in classrooms with a larger proportion of non-Belgian children and children with a low SES. Furthermore, the same pattern is expected for the gender classroom composition. We anticipate that teachers' expectations will be higher in classes with a larger proportion of girls than in classes with a larger proportion of boys.

Third, from an ecological viewpoint (Bronfenbrenner, 1986), individual and classroom characteristics may also jointly contribute to the teachers' expectations. Therefore, the current study investigates whether interactions between child characteristics and classroom composition are associated with the teachers' expectations. Analogous to the findings of McKown and Weinstein (2008), we expect to find a differential effect of children's ethnicity in the association between ethnic classroom composition and teachers' expectations. Interactions between the other classroom composition factors, namely gender and SES, and the individual child characteristics in the predictions of teachers' expectations are explored.

2. Method

2.1. Sample

The data were collected in the context of the large-scale longitudinal SiBO-project (i.e., the Dutch acronym for School Careers in Primary Education) (Maes, Ghesquière, Onghena, & Van Damme, 2002). The project initiated in 2002 and intended to describe and explain inter-individual differences in children's developmental trajectories throughout elementary school in Flanders (Dutch speaking part of Belgium). For that purpose, a cohort of students was followed from the end of kindergarten (ages 5 to 6) until the end of sixth grade (ages 11 to 12). The SiBO project involved a random stratified sample of 122 schools. Stratification was based on educational network and school size. This sample was representative for the

entire Flemish school population in terms of the applied stratification criteria, the geographic area and the proportion of disadvantaged students targeted by the Act of Equal Opportunities in Education (Verhaeghe, Maes, Gombeir, & Peeters, 2002) The dataset in the current study comprised a sample of 1,883 kindergarten children from 128 classes at 121 schools, with one teacher for every class. The children were in kindergarten (the year before primary school) during the school year 2002-2003. At the start of that school year, children's average age was 5 years and 10 months. In Flanders, attending kindergarten is voluntary. Nevertheless, 99% of all the 4-5 year olds are going to kindergarten on a regularly basis (OECD, 2000).

2.2. Instruments

All instruments that were used to operationalize the variables yielded adequate internal consistency, with Cronbach's alpha ranging from .75 to .93 (Gadeyne, 2003; Maes, 2003; Verachtert, 2003; Reynders, Van Heddegem, Nicaise, & Van Damme, 2004).

2.2.1. Language and Math Achievement Test

Children's scores on calibrated achievement tests in language and math were used as measures of prior achievement. Language and math achievement was assessed in the beginning (September 2002) of the school year (Verachtert, 2003). The language achievement test consisted of 40 items divided into five subtests: listening comprehension, sound and rhyme, auditory sequencing, literacy knowledge, and sound blending (Buyse, Verschueren, Verachtert, & Van Damme, 2009). The math achievement test assessed skills in number sense such as comparing magnitudes, counting, and understanding mathematical concepts (Verachtert, Van Damme, Onghena, & Ghesquière, 2009). Internal consistencies were high with Cronbach's alpha of .86 for language achievement and .93 for math achievement.

2.2.2. Child Characteristics

The child's characteristics gender, SES, and ethnicity were retrieved from a parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004). The variable 'gender' was represented by a dichotomous variable with a score of "1" for boys (51.5%) and "0" for girls (48.5%). The 'SES' of the child is a continuous standardized variable representing the socioeconomic status of the child's family and it was composed of five indicators: the educational level of mother and father (rated on a 5-point Likert scale), the occupation of mother and father (rated on a 7-point Likert scale) and the monthly household income (rated on a 6-point Likert scale) (Reynders, Nicaise, & Van Damme, 2005). The alpha value for this factor was .82. Parents' nationality at birth was used as an indicator of children's 'ethnicity'. Children were classified into one of two categories: both parents had a Belgian nationality at birth (Belgian or majority; 84.1%; coded as 0) or one of the parents (or both parents) had a non-Belgian nationality (non-Belgian or minority; 15.9%, coded as 1). This latter group contained children with parents of West European, Turkish, Maghreb, or Eastern European descent.

2.2.3. Classroom Characteristics

Following classroom composition variables were included: gender composition (percentage boys in the classroom), SES composition (the class mean SES) and ethnic composition (percentage non-Belgian children in the classroom). These variables were aggregated measures at the class-level from data at the child-level.

2.2.4. Teachers' Expectations

Teacher questionnaires were used to assess the teachers' expectations (Maes, 2003). In February 2003, teachers were given a questionnaire in which they had to answer questions concerning each child in their classroom. The continuous variable 'teachers' expectations' in the current study is based on 4 items, i.e., 'the child is highly gifted' (rated on a 6-point Likert scale), 'the child will need extra care in the future' (rated on a 6-point Likert scale and inversed), 'the child will be able to

succeed in higher education' (rated on a 4-point Likert scale) and 'the child is performing better relative to his or her peers' (rated on a 3-point Likert scale). These items were chosen based on their correspondence with the items that were used before in teacher expectation research. Dusek and Joseph (1983) defined academic expectations as teachers' perceptions of students' performance, achievement, ability and attainment. The items covering teachers' expectations in our study correspond to the items used by various authors (Jussim & Eccles, 1992; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). For example, "the child is highly gifted" is equivalent to "how much natural mathematical talent does this student have?" (Jussim & Eccles, 1992) to "he or she is a smart student" and "he or she is an intelligent student" (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). The second and third item "the child will need extra care in the future" and "the child will be able to succeed in higher education" correspond to "he or she will probably have a successful school career" (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). The fourth item measuring teachers' expectations (i.e., "the child is performing better relative to his or her peers") matches "compared to other students in this class, how well is this student performing in math?") (Jussim & Eccles, 1992) The internal consistency of our expectation scale was good (Cronbach's alpha = .83).

2.3. Data Analysis Strategy

Child and class predictors of teachers' expectations were examined by implementing a multilevel regression model. This approach is required because children are nested within classrooms and within schools. Children from the same classroom and school are more similar to one another and this can lead to dependencies. Multilevel modeling takes into account this class and school membership (Goldstein, 2010). Analyses were performed with the multilevel modeling program MLwiN (Goldstein, 1995). In the present study, two levels were distinguished: the child-level and the class-level. Because of the strong overlap between the number of classes (128) and the number of schools (121), the school-level was not taken into account. To ease the

interpretation, all continuous predictors were centered around their grand mean (Hox, 2010). Furthermore, standardized coefficients were used as a measure of effect size and they were calculated using formula described by Tymms (2004). The analyses were built stepwise with increasing complexity for each successive model.

First, a model was fitted without any explanatory variables (Model 0). This unconditional model was used as a baseline model. With this model, the variance of teachers' expectations was partitioned into variation between and within classes. To determine the proportion of variance in the dependent variable attributable to classroom membership, the intra-class correlation coefficient (ICC) was calculated. In the second model (Model 1), we included children's prior language and math achievement as control variables. In this model, no explanatory variables were added at the class-level. In the third model (Model 2), children's explanatory variables (i.e., gender, SES, and ethnicity) were added to examine the association between child characteristics and teachers' expectations. Again, no explanatory variables were added at the class-level. To examine the association between class composition variables (i.e., the mean SES of the class, the percentage boys in the class and the percentage non-Belgian children in the class) and teachers' expectations, classroom explanatory variables were added to the fixed part of the previous model (Model 3). Finally, cross-level interactions between levels were tested (Model 4) using a parsimonious model specification. Only the significant interactions were included in the final model.

3. Results

3.1. Preliminary Analyses

Descriptive statistics and correlations among the variables are presented in Table 1 en 2 resp.; an overview of the different models is presented in Table 3. Model 0 is the unconditional model, without any explanatory variables. The percentage of variance situated at the class-level was computed by dividing the class-level variance by the total variance which equals the sum of the class-level variance and the child-level

variance [.038/(.038+.921) = .04]. The class-level accounted for 4% of the total variance in the outcome variable teachers' expectations. The proportion of variance situated at the child-level equalled .96, indicating that the child-level accounted for 96% of the total variance in the outcome variable. Thus the variance in teachers' expectations was larger at the child-level than at the class-level.

The next model included children's prior language and math achievement scores as control variables (Model 1). Both language and math achievement scores were positively related to the teachers' expectations. After entering these background variables, results indicated that the class-level accounted for 23% and the child-level for 77% of the total variance in teachers' expectations. Compared with the unconditional model, the inclusion of the background variables resulted in a significant model improvement ($\Delta\chi^2$ (2) = 1445.822, $p < .001$).

Table 1. Descriptive Statistics

Measure	Min.	**Max.**	**M**	**SD**	%
Dependent Variable					
Teachers' expectations	-1.95	1.84	0.10	0.98	
Control Variables					
Language achievement	16.02	69.56	45.09	9.67	
Math achievement	17.00	61.44	44.29	9.07	
Individual (Child) Variables					
Gender (boy)					51.50
SES	-2.19	2.07	0.06	0.85	
Ethnicity (non-Belgian)					15.90
Contextual (Class) Variables					
Gender composition (boy)	0.22	0.83	0.51	0.11	
SES composition	-1.24	0.80	0.04	0.38	
Ethnic composition (non-Belgian)	0.00	0.87	0.16	0.18	

Table 2. Correlations

		1	2	3	4	5	6	7	8
1	Language achievement								
2	Math achievement	.732**							
3	Gender	-.037	.017						
4	SES	.317**	.392**	.030					
5	Ethnicity	-.282**	-.315**	-.037	-.230**				
6	Gender composition	-.011	.063**	.227**	.047*	-.060**			
7	SES composition	.176**	.204**	.022	.432**	-.204**	.104**		
8	Ethnic composition	-.156**	-.189**	-.028	-.170**	.473**	-.109**	-.414**	
9	Teachers' expectations	.611**	.669**	-.068**	.408**	-.142**	.029	.081**	-.001

Note. ** $p < .01$; * $p < .05$

Table 3. Model Estimates of the Multilevel Analyses

		Model 0		Model 1		Model 2		Model 3		Model 4	
Parameters		Est	SE	Est	SE	Est	SE	Est	SE	Est	SE
Fixed Parameters											
Constant		0.096	0.028	0.111	0.034	0.149	0.037	0.143	0.035	0.129	0.034
Control variables											
	Language			0.031	0.002***	0.031	0.002***	0.031	0.002***	0.031	0.002***
	Math			0.055	0.003***	0.050	0.002***	0.050	0.002***	0.051	0.002***
Child variables											
	Gender					-0.137	0.028***	-0.139	0.029***	-0.136	0.029***
	SES					0.224	0.019***	0.238	0.019***	0.238	0.019***
	Ethnicity					0.231	0.044***	0.199	0.045***	0.110	0.050*
Classroom variables											
	Gender composition							0.200	0.269	0.174	0.266
	SES composition							-0.310	0.087***	-0.297	0.086***
	Ethnic composition							0.478	0.185*	0.154	0.200
Cross-level											
	Ethnicity x Ethnic composition									0.880	0.221***
Random Parameters											
Class-level		0.038	0.013**	0.116	0.018***	0.117	0.018***	0.090	0.015***	0.087	0.014***
Child-level		0.921	0.031***	0.395	0.013***	0.359	0.012***	0.359	0.012***	0.357	0.012***
Total		0.959		0.511		0.476		0.449		0.444	
-2*loglikelihood		5248.578		3802.756		3635.177		3607.744		3591.987	

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

3.2. Child Predictors

Model 2 provides information about the association between child characteristics and teachers' expectations. Results showed that, after controlling for children's prior achievement, teachers' expectations were higher for girls compared to boys (b = -.14, ES = -.23, p < .001), for high-SES children compared to low-SES children (b = .22, ES = .32, p < .001), and for non-Belgian children compared to Belgian children (b = .23, ES = .39, p < .001). The inclusion of the child characteristics to the previous model led to a significant improvement in model fit ($\Delta\chi^2$ (3) = 167.579, p < .001).

3.3. Classroom Predictors

Model 3 shows the estimates for the class composition variables. Teachers had higher expectations in low-SES classes (b = -.31, ES = -.20, p < .001) and in classes with a larger proportion of non-Belgian children (b = .48, ES = .14, p < .05). Inclusion of the composition variables resulted in a significant improvement in model fit ($\Delta\chi^2$ (3) = 27.433, p < .001).

3.4. Cross-level Interactions

In model 4, all significant cross-level interactions were added to the previous model. Only one interaction was significant. Findings showed a significant positive interaction between children's ethnicity and the ethnic composition of the class (b = .88, ES = .27, p < .001). As shown in Figure 1, the teachers' expectations for non-Belgian children were higher in classes with a larger proportion of non-Belgian children than in classes with a larger proportion of Belgian children. For Belgian children, there was virtually no effect of the ethnic class composition on the expectations of the teacher.

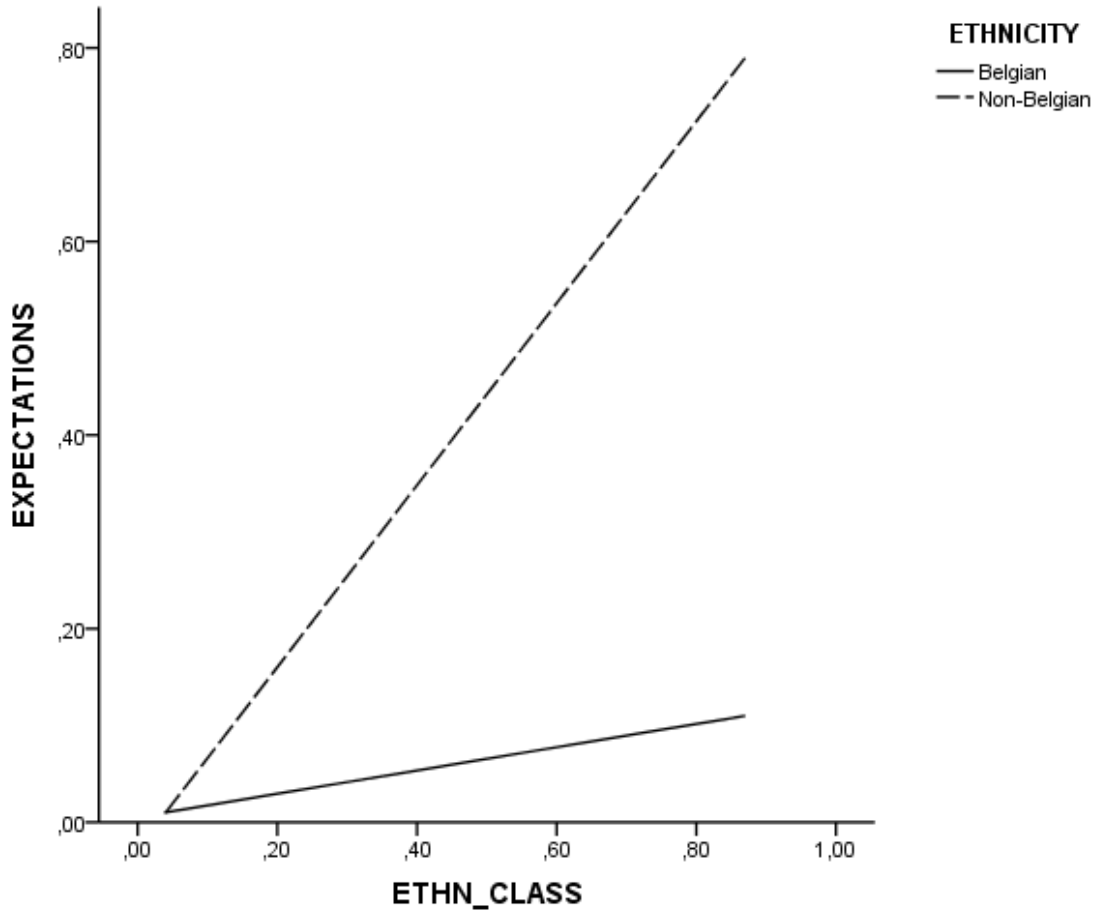

Figure 1. Cross-level interaction between the ethnic composition of the class and children's ethnicity in predicting teachers' expectations. The ethnic composition of the class is represented by a scale from 0 to 1. A high score indicates that the class consists of predominantly non-Belgian children. A low score indicates that the class consists of predominantly Belgian children.

4. Discussion

Adopting an ecological perspective (Bronfenbrenner, 1986), the present study examined interactions between students and teachers interpreted within a broader social context. To understand how teachers form expectations about their students, researchers should not only pay attention to individual child characteristics, but important context variables should also be considered. Therefore, we investigated the role of both child and classroom characteristics in predicting teachers' expectations. Results showed that teachers' expectations in kindergarten were higher

for girls and children from a higher socioeconomic background. Furthermore, teachers' expectations were also higher if the class was composed of predominantly lower-SES children. Finally, compared to the expectations for Belgian children, teacher's expectations for non-Belgian children were higher in classes with a larger proportion of non-Belgian children. These findings will be discussed in more detail in the following sections.

First, the results of the present study indicate that after taking into account prior achievement, teachers' expectations were also associated with children's gender and SES. As expected, the expectations were higher for girls and children with a higher SES compared to the expectations for boys and children with a lower SES. This finding supports previous research on child predictors of teachers' expectations (Auwarter & Aruguete, 2008; Hinnant, O'Brien, & Ghazarian, 2009) and indicates that teachers in kindergarten lower their expectations for children who are at-risk for school failure.

Next, results concerning classroom predictors of teachers' expectations pointed to a SES composition effect and a ethnic composition effect in interaction with the child's ethnicity. There was no significant effect of gender composition. Surprisingly, the expectations of teachers were higher in classes with a higher percentage of low-SES children. This result may be due to what Peetsma, van der Veen, Koopman, and van Schooten (2006) described as a "specialisation effect". Teachers of classes with a higher proportion of these children possibly may have developed more expertise in teaching and may make more effort to improve children's progress. A comparable result was found by Rubie-Davies, Flint and McDonald (2012) in New Zealand. Although it was concluded that the school socioeconomic level was not associated with teaches' expectations, school composition did negatively predict teacher efficacy. Teacher efficacy was higher in lower socioeconomic level schools than in higher socioeconomic level schools. According to the authors, experienced teachers do not choose to teach in high socioeconomic schools because in these schools, parents are putting too much pressure on teachers to ensure successful outcomes.

Furthermore, in line with McKown and Weinstein (2008), we found a differential effect of children' ethnicity in the association between ethnic classroom composition and teachers' expectations. However, in contrast to what we predicted, the expectations in kindergarten were higher for non-Belgian children when these children belonged to classes with more non-Belgian children than when they belonged to classes with more Belgian children. This differential effect of ethnic class composition also corroborates the findings of Peetsma, van der Veen, Koopman, and van Schooten (2006). When teaching a class with predominantly non-Belgian pupils, teachers do not seem to lower their standards, but they adapt their beliefs and teaching towards these children. This finding is important because minority children are known to have fewer resources and less parental support and therefore have to rely more on their teachers than majority children (den Brok, van Tartwijk, Wubbels, & Veldman, 2010).

4.1. Conclusions and Implications

Because teachers' expectations are known to influence children's later outcomes, it is important to study how these expectations are formed. The findings of the present study suggest that teachers indeed base their expectations on prejudiced information about individuals, at least concerning children's gender and socioeconomic background. It is of great importance that teachers become aware of these preconceptions. Furthermore, the results underscore the importance of not only focusing on individual child characteristics in isolation, but also on classroom characteristics when studying teachers' expectations. Although teachers lowered their expectations for the individual low-SES child, they do not have lower expectations when they are teaching classes with more low-SES children. Next, our results point out that the ethnic classroom composition is of significance for non-Belgian children. Teachers held higher expectations when these children belonged to classes with more non-Belgian children than when they belonged to classes with more Belgian children. It thus seems that these children would benefit more from being in a class with a higher proportion of children with the same ethnic

background. However, it should be noted that this result is limited to teachers' expectations and cannot be generalized to children's achievement outcomes. Future research should examine whether these conclusions still hold when using another dependent variable than teachers' expectations. Finally, our findings revealed that expectations are already formed for very young children who are at the beginning of their education. Because younger children seem to be more susceptible to teachers' expectations (Brophy, 1983), both education policy makers and researchers should continue to highlight the crucial role of teachers and their expectations in guiding these young children throughout their school career.

CHAPTER 4

Associations among Teachers' and Parents' Expectations and Kindergartners' Achievement

Abstract

This study examines specialized associations between teachers' and parents' expectations and kindergartners' end of year achievement (n = 3,158). Results show that teachers' and parents' expectations are, both independently and congruently, associated with children's achievement. These associations are the strongest for children from lower socioeconomic backgrounds, indicating that expectations may reinforce social inequalities. Furthermore, if teachers and parents have differential expectations, the effect of the parents predominates. Our results highlight the importance of parents' protecting role in their children's education as they may counterbalance the negative influences of the teachers' expectations.

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1. Introduction

A major concern in the educational system is the lack of academic success for certain children. For example, children with a lower socioeconomic status (SES) have lower achievement scores both in the United States and in Europe. A possible contributor to the existing achievement gap is the expectation of teachers, as they may adhere to stereotypes which in turn may affect children's outcomes (Rubie-Davies, 2009). The effects of expectations are found to be genuinely existing and they are enlarged for younger children and children from academically stigmatized groups (Jussim & Harber, 2005). Notably, children's academic development is a result of different factors. Complex interactions between children, teachers and parents can either support or hamper children's progress. From an ecological point of view (Bronfenbrenner, 1986), it is therefore important to include all these contexts when studying expectation effects. Some studies have considered both teachers' and parents' influences on children's achievement (Gill & Reynolds, 1999; Mistry, White, Benner, & Huynh, 2009) and found that teachers' expectations emerged as a stronger predictor than parental expectations. Nevertheless, the generalizability of these findings was restricted because the sample consisted of low-income African-American children age 6 or older. Furthermore, the focus was on either teachers or parents. The question whether teachers' and parents' expectations congruently and dissonantly influence children's achievement has, to the best of our knowledge, only been addressed in one study (Benner & Mistry, 2007). However, the low-income sample of children age 8 or older again hampers the generalizability. Moreover, this study did not control for prior achievement, so the results are likely to be biased.

By using a Latent Sum and Difference SEM model, the current study sought to further investigate the specificity of associations between teachers' and parents' expectations and children's end of year achievement, controlling for achievement at the beginning of the school year. We opted to focus on kindergarten children because research has suggested that expectation effects were particularly important in early elementary grades (Hauser-Cram, Sirin, & Stipek, 2003). First, expectation effects were tested for teachers and parents separately. In line with the literature, we

expected that higher/lower expectations would associate with higher/lower achievement at the end of the school year. Second, combined and differential effects of teachers' and parents' expectations were examined. Following Benner and Mistry (2007), we hypothesized that combined expectations would be positively associated with academic outcomes. Further, because the teachers' influences on children's academic outcomes seemed to be stronger than the home influences (Mistry, White, Benner, & Huynh, 2009), we anticipated that the effects would be in favour of the teachers if differential expectations would emerge. Third, moderation effects of children's SES were also tested. Given that children who are member of a vulnerable group are more susceptible to the effects of expectations (Jussim & Harber, 2005), we assumed that the associations between adults' expectations and children's outcomes would be stronger for children with a lower SES.

2. Method

2.1. Sample

The data in this study were part of a large-scale longitudinal survey in primary education (i.e., SiBO which is the Dutch acronym for Trajectories through Primary Education) (Maes, Ghesquière, Onghena, & Van Damme, 2002). The purpose of the project was to describe and explain inter-individual differences in children's developmental trajectories during kindergarten and elementary school in Flanders (Dutch speaking part of Belgium). The SiBO project involved a random stratified sample of 122 schools which is representative for the entire Flemish school population in terms of educational system, school size and geographic area (Verhaeghe, Maes, Gombeir, & Peeters, 2002). The dataset in the current study comprised a sample of 3,158 children who were in kindergarten (final preschool year) during the school year 2002-2003. At the start of that school year, children's average age was 5 years and 10 months. It should be noted that although attending kindergarten is voluntary in Flanders, 99% of all the 4-5 year olds are going to school on a regularly basis (OECD, 2000).

2.2. Measures

2.2.1. Kindergarten Achievement

Children's scores on calibrated achievement tests in language and arithmetic were used as a measure of achievement. The tests were administered at the beginning (September 2002) and the end (May 2003) of the school year (Verachtert, 2003). The language achievement test consisted of 40 items divided into five subtests: listening comprehension, sound and rhyme, auditory sequencing, literacy knowledge, and sound blending (Buyse, Verschueren, Verachtert, & Van Damme, 2009). The arithmetic achievement test assessed skills in number sense such as comparing magnitudes, counting, and understanding mathematical concepts (Verachtert, Van Damme, Onghena, & Ghesquière, 2009). Internal consistencies were high with Cronbach's alpha of .86 for language achievement and .93 for arithmetic achievement. To have a more comprehensive measure of children's general achievement, we used a standardized composite score based on the mean of the language and arithmetic test at each moment. The Cronbach's alpha for the general achievement score was .92.

2.2.2. Socioeconomic Status

The child's socioeconomic status or SES was retrieved from the parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004). The SES of the child was a continuous standardized variable and was composed of five indicators: the educational level of mother and father (rated on a 5-point Likert scale), the occupation of mother and father (rated on a 7-point Likert scale) and the monthly household income (rated on a 6-point Likert scale) (Reynders, Nicaise, & Van Damme, 2005). The alpha value for this variable was .82. In order to test the possible moderation effects of children's SES, the variable was divided into the following three categories: low SES = -2.19 to -0.41 (M = -0.93, SD = 0.39) , middle

SES = -0.39 to 0.39 (*M* = 0, *SD* = 0.23), and high SES = 0.42 to 2.07 (*M* = 0.98, *SD* = 0.42).

2.2.3. Teachers' Expectations

Teacher questionnaires were used to assess the teachers' expectations (Maes, 2003). In February 2003, teachers were given a questionnaire concerning each child in their classroom. The latent construct teachers' expectations was composed of three indicators , i.e., 'the child will need extra care in the future' (rated on a 6-point Likert scale and inversed) (*M* = 4.03, *SD* = 1.51), 'the child will be able to succeed in higher education' (rated on a 4-point Likert scale) (*M* = 2.84, *SD* = 0.88) and 'the child is performing better relative to his or her peers' (rated on a 3-point Likert scale) (*M* = 2.28, *SD* = 0.75). These items correspond with the items generally used in teacher expectation research. Dusek and Joseph (1983) defined academic expectations as teachers' perceptions of students' performance, achievement, ability and attainment. The items covering teachers' expectations in our study correspond to the items used by various authors (Jussim & Eccles, 1992; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).

2.2.4. Parents' Expectations

The parent questionnaire administered in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004) was used to assess parental expectations. Parallel to 'teachers' expectations', the latent construct 'parents' expectations' was characterised by three indicators, i.e., 'my child will need extra care in the future' (rated on a 6-point Likert scale and inversed) (*M* = 4.71, *SD* = 1.34), 'my child will be able to succeed in higher education' (rated on a 4-point Likert scale) (*M* = 2.85, *SD* = 0.69) and 'my child is performing better relative to his or her peers' (rated on a 3-point Likert scale) (*M* = 2.33, *SD* = 0.55).

2.3. Data Analysis Strategy

To examine how prior achievement, teachers' expectations and parents' expectations were related to children's achievement at the end of the school year, Structural Equation Modelling (SEM) was used. First, two separate models were fitted to the teacher and parent data. Second, the combined and differential effects of both expectations' types were tested using a Latent Sum and Difference Structural Equation Model (Nelson, Hart, Yang, Olsen, & Jin, 2006). In this model, the latent variables were re-expressed into a combined and differential latent construct. The combined latent construct represents the sum of the expectations of both teachers and parents. This second-order construct had fixed paths of 1.0 to both teachers' and parents' expectations. The differential latent construct represents the extent of discrepancy between both expectations' types. This second-order construct had a fixed path of 1.0 to teachers' expectations and a fixed path of -1.0 to parents' expectations. A positive estimate indicated that there was an effect in favour of the teachers; a negative estimate indicated an effect in favour of the parents. For more information concerning the Latent Sum and Difference Structural Equation Model see Nelson, Hart, Yang, Olsen and Jin (2006).

Parameter estimates and goodness-of-fit indices were computed using Mplus Version 6.0 (Muthén & Muthén, 2010). Because our data contained missing values and deviated from normality, a robust maximum likelihood estimator (MLR) was employed. This estimator results in parameter estimates and standard errors that are robust to missing data and violations of normality. To evaluate the size of the effects, Cohen's effect size index f^2 was calculated with $f^2 \geq 0.35$ indicating a large effect, $f^2 \geq 0.15$ a medium effect and $f^2 \geq 0.02$ a small effect (Cohen, A power primer, 1992) The models' goodness-of-fit were evaluated using a modified chi-squared statistic that is based on the Yuan-Bentler T2* test statistic (Y-Bχ^2) (Muthén & Muthén, 2007) However, because the χ^2 measure is sensitive to sample size, additional goodness-of-fit measures were used, i.e., the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI). RMSEA and SRMR values of .05 or lower, and CFI values of .97 or higher indicate a good fit, RMSEA and SRMR values between .05 and .08 and CFI values between .95 and .97 indicate an acceptable fit (Schermelleh-Engel, Moosbrugger, &

Müller, 2003). To compare nested models, the Satorra-Bentler-Scaled-χ^2-difference-test (ΔSBS-χ^2) was used.

Moderating effects of children's SES were examined by means of multi-group modeling. This analysis technique compares a constrained model, in which all the structural coefficients of the model are set equal across groups, with a more unconstrained model, in which some of the coefficients are allowed to vary across the groups. A significant scaled-χ^2-difference-test implies that cross-group constraints were not tenable (Gustafsson & Stahl, 2000).

3. Results

3.1. Descriptive Statistics

Descriptives can be found in Table 1.

Table 1. Descriptive Statistics

Measure	Min.	Max.	M	SD	% missing
ACH_B	-2.94	2.32	0	1	0.20
ACH_E	-3.57	2.13	0	1	0.13
SES	-2.19	2.07	0.01	0.86	2.69
T_FUTCARE	1	6	4.03	1.51	0.44
T_HIGHED	1	4	2.84	0.88	6.11
T_RELACH	1	3	2.28	0.75	2.15
P_FUTCARE	1	6	4.71	1.34	9.59
P_HIGHED	1	4	2.85	0.69	22.42
P_RELACH	1	3	2.33	0.55	6.27

Note. ACH_B = achievement at the beginning of the school year; ACH_E = achievement at the end of the school year; SES = socioeconomic status; T_FUTCARE = future care predicted by the teacher; T_HIGHED = higher education predicted by the teacher; T_RELACH = relative achievement predicted by the teacher; P_FUTCARE = future care predicted by the parent; P_HIGHED = higher education predicted by the parent; P_RELACH = relative achievement predicted by the parent.

3.2. Structural Models of Teachers' and Parents' Expectations

To estimate the effects of expectations on children's achievement, models were fitted separately for teachers and parents. Both models provided a good fit (see Table 2). The expectations of both teachers ($\beta = .18$, $p < .001$, $f^2 = .033$) and parents ($\beta = .12$, $p < .001$, $f^2 = .015$) were positively associated with children's achievement at the end of the school year, controlling for prior achievement.

Table 2. Model Fits

	Y-Bχ^2	df	RMSEA	SRMR	CFI
Structural Model for Teachers	25.54	4	.041	.008	.994
Structural Model for Parents	29.51	4	.045	.020	.992
Combined and Differential Model	218.66	17	.061	.043	.971

Note. Y-Bχ^2 = Yuan-Bentler chi-squared statistic; df = degrees of freedom; RMSEA= Root Mean Square Error of Approximation; SRMR= Standardized Root Mean Square Residual; CFI= Comparative Fit Index.

3.3. Combined and Differential Expectation Effects

Testing the combined and differential model (Figure 1) yielded an acceptable fit. First, the combined expectations were positively related with children's achievement ($\beta = .45$, $p < .001$, $f^2 = .254$). Next, a differential effect emerged ($\beta = -.22$, $p < .001$, $f^2 = .051$). As indicated by the negative parameter estimate, the effect of the parents predominates.

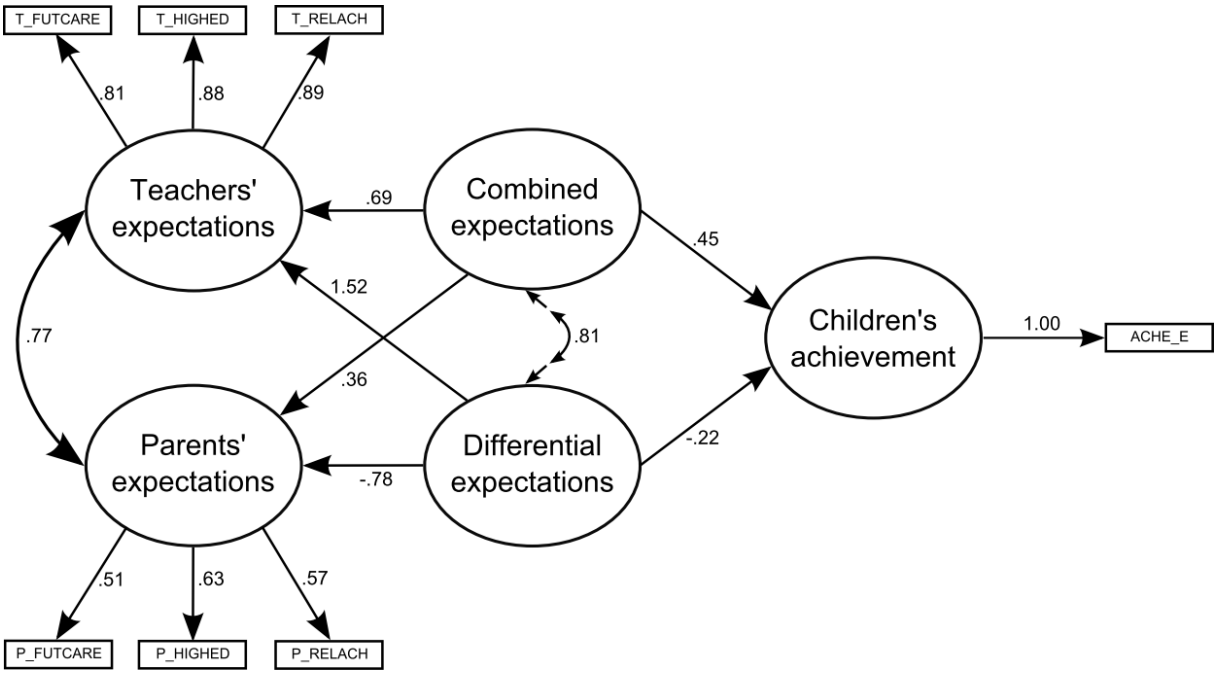

Figure 1. Latent sum and difference model. For reasons of clarity, estimates for children's prior achievement and SES differences are not reported. All coefficients are standardized and significant (p<.001). T_FUTCARE = future care predicted by the teacher; T_HIGHED = higher education predicted by the teacher; T_RELACH = relative achievement predicted by the teacher; P_FUTCARE = future care predicted by the parent; P_HIGHED = higher education predicted by the parent; P_RELACH = relative achievement predicted by the parent. ACH_E = achievement at the end of the school year.

3.4. Moderation Effects

Multi-group analyses showed that the structural models were moderated by children's SES (ΔSBS-χ^2 (2) = 272.23, $p < .01$ for teachers; ΔSBS-χ^2 (2) = 477.20, $p < .05$ for parents). The association between the expectations and achievement was the strongest for low SES children ($\beta = .19$, $p < .001$, $f^2 = .037$ for teachers; $\beta = .16$, $p < .001$, $f^2 = .026$ for parents), followed by middle SES ($\beta = .18$, $p < .001$, $f^2 = .033$ for teachers; $\beta = .11$, $p < .001$, $f^2 = .012$ for parents) and high SES children ($\beta = .12$, $p < .01$, $f^2 = .015$ for teachers; $\beta = .07$, $p < .01$, $f^2 = .005$ for parents). Parallel to the results of the structural models, children's SES moderated the association between the combined expectations and children's achievement (ΔSBS-χ^2 (2) = 7.678, $p < .05$). The association

was the strongest for low SES children (β = .21, $p < .001$, $f^2 = .046$), followed by middle SES (β = .17, $p < .001$, $f^2 = .030$) and high SES children (β = .15, $p < .01$, $f^2 = .023$). The association between the differential expectations and children's achievement was not significant for the different SES groups (β = .05, .02 and -.02, $p = .062$, .459 and .462, for low SES, middle SES and high SES, respectively).

4. Discussion

In a large, nationally representative sample of kindergartners (n=3,158), we found that teachers' and parents' expectations are, both independently and congruently, associated with children's achievement, controlling for their prior achievement. These findings are in line with the literature (Jussim & Harber, 2005; Benner & Mistry, 2007) and suggest that higher/lower adult expectations may have generative/disruptive consequences for children. Furthermore, our data showed that these consequences are larger for vulnerable children, indicating that expectations may reinforce social inequalities. Because stigmatization is known to play a part in social inequalities, it is of great importance to keep on identifying those factors that provoke and maintain stereotypic thinking, so that all children can be academically successful.

More interesting, we found that if teachers and parents have differential expectations, the effect of the parents predominates. A possible explanation may be that the children in our sample are still very young and therefore, home compared to school influences still have a greater impact on children's outcomes. This result suggests that parents can counterbalance negative expectations of teachers and protect their children from the influences that teachers have on achievement. Therefore, educators should acknowledge the importance of such parental influences, especially for younger children.

CHAPTER 5

Longitudinal Reciprocal Associations between Teachers' Expectations and Students' Mathematics Achievement in Elementary School

Abstract

This study was meant to investigate the long-term reciprocal associations between teachers' expectations and students' mathematics achievement in elementary school (n = 5,250). Furthermore, differential effects of students' ethnicity and socioeconomic status were assessed. By means of a seven-wave longitudinal reciprocal structural equation model, results demonstrated that teachers based their expectations on students' prior achievement. Furthermore, teachers' expectations predicted students' later achievement within one school year as well as across several school years through a transfer of expectations of different teachers over time. Finally, the associations between expectations and achievement did not differ between Belgian and non-Belgian students nor between low, middle, and high SES students.

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1. Introduction

An important educational objective is to prevent school failure for students who are members of stigmatized ethnic minority or social groups. These students have been found to have lower achievement scores than their non-stigmatized peers and one of the factors contributing to this achievement gap is the expectation of the teacher in the classroom (Weinstein, Gregory, & Strambler, 2004). Teachers may have lower expectations for these students which in turn may affect their future performance (McKown & Weinstein, 2008; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010; Speybroeck, et al., 2012). Teachers base their expectations on information they have about their students (e.g., socioeconomic background or past achievement) and the expectations may consequently also influence students' later achievement. To date, the precise nature of these associations remains unresolved.

1.1. Reciprocal Associations between Expectations and Achievement

To gain insight into the direction of the associations Goldenberg, Gallimore, Reese and Garnier (2001) compared two models of associations between (parental) expectations and achievement. The first model specified the effects of achievement on expectations (performance-driven model), the second model described the influence of expectations on achievement (expectations-driven model). The authors could only find evidence for the 'performance-driven model'. The expectations did not influence students' later performance. Nevertheless, this study highlighted the need to change the focus from examining solely the unidirectional associations between expectations and achievement to examining the bidirectional associations in which expectations and achievement mutually influence each other. The directionality of the associations between teachers' expectations and students' performance has received little attention in literature. This lack of attention is due to the cross-sectional research design in most studies and to not including the effects of achievement on expectations in the studies that did use longitudinal data. To the best of our knowledge, only two studies have examined the reciprocal associations

between teachers' expectations and students' achievement. Crano and Mellon (1978) used a cross-lagged panel model and concluded that teachers' expectations predicted students' achievement more than achievement predicted expectations. Mistry, White, Benner and Huynh (2009) investigated reciprocal associations between teachers' expectations and achievement of low-income students. Results showed that the expectations of teachers did not predict students' later test scores nor did students' test scores predict the teachers' expectations.

Research on teachers' expectations has shown that, in general, the effects of expectations on students' later outcomes are rather small, with effect sizes (r) ranging from .10 to .20 (Jussim & Harber, 2005). These small effects are due to the fact that teachers mostly base their beliefs on valid objective information concerning students' past performance rather than on subjective or biased information (Jussim, Eccles, & Madon, 1996; Madon, Jussim, Keiper, Eccles, Smith, & Palumbo, 1998). That way, teachers may accurately predict students' later achievement and thereby their influences are likely to be reduced. Students' prior achievement has indeed been found to be highly predictive of teachers' expectations (Trouilloud, Sarrazin, Martinek, & Guillet, 2002).

1.2. Accumulation over Time

Despite the fact that the effects of expectations are quite small, under certain conditions or for some people, the effects may be large. For example, the effects of expectations could become more powerful by means of accumulation over time (Jussim & Harber, 2005; Madon, Willard, Guyll, Trudeau, & Spoth, 2006). Short-term small effects (e.g., within one school year) could then become larger over a longer period of time (e.g., across several school years). Accumulation over time takes place when the effect of teachers' expectations is stronger on students' distal outcomes than on their proximal outcomes (Madon, Willard, Guyll, & Scherr, 2011). However, most studies that have examined the long-term effects of teachers' expectations concluded that the expectations effects do not accumulate, but rather dissipate or stabilize over time (Smith, Jussim, & Eccles, 1999; Hinnant, O'Brien, & Ghazarian,

2009; de Boer, Bosker, & van der Werf, 2010). According to Madon, Willard, Guyll and Scherr (2011), the long-term effects of teachers' expectations could also be understood in the context of a 'repeated belief model'. This model describes the combined effects of independent expectations at different time points on an outcome at a later point in time (Madon, Willard, Guyll, & Scherr, 2011). Only one study investigated the long-term effects of expectations via this 'repeated belief model' (Madon, Willard, Guyll, Trudeau, & Spoth, 2006). The authors concluded that the beliefs of mothers across several years accumulatively predicted their children's alcohol use over time. However, the authors focused on the effects of mothers' beliefs on children's alcohol use rather than on the effects of teachers' beliefs on students' educational outcomes.

1.3. Ethnic and Socioeconomic Differences

The effects of teachers' expectations may also be larger for certain groups of students. For example, students who are at risk for negative school outcomes such as ethnic minority students or students from lower socioeconomic backgrounds are known to be more susceptible to the effects. Jussim, Eccles and Madon (1996) concluded that teachers' expectations predicted students' performance more strongly for students from lower social class backgrounds and African American students than for students from higher social class bakcgrounds and White students. Similarly, McKown and Weinstein (2002) found that the effects of teachers' expectations on math and reading achievement were stronger for African American students than for Caucasian students. Also Hinnant, O'Brien, and Ghazarian (2009) demonstrated that teachers' expectations were more strongly related to later performance for minority (non-White) students compared to majority (White) students. However, these results contradict the findings of studies conducted in the Netherlands were students' ethnicity did not moderate the association between expectations and achievement (de Boer, Bosker, & van der Werf, 2010; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010) and in Belgium were the effects of teachers' expectations on achievement even seemed to be stronger for majority than for minority children

(Speybroeck, et al., 2012). Hence, the picture on the moderating effect of ethnicity and SES remains unclear.

1.4. This Study

In the light of the repeated belief model which operationalizes expectations measured at different time points (Madon, Willard, Guyll, Trudeau, & Spoth, 2006), the present study further investigated the sustainability effects of teachers' expectations on students' mathematics achievement during elementary school, controlling for their prior achievement in kindergarten. We extended the repeated belief model by examining the expectations of different teachers over time. Furthermore, because the associations between teachers' expectations and students' achievement likely reflect a bidirectional rather than a unidirectional process, we also assessed whether students' mathematics achievement has long-term effects on teachers' expectations. We were particularly interested in how the effects evolve over time for students from stigmatized groups.

By using an integrated seven-wave longitudinal reciprocal model, we first examined whether teachers' expectations in elementary school predict students' mathematics achievement across several school years, controlling for students' achievement in kindergarten (expectations-driven model). In line with the literature concerning the long-term effects of teachers' expectations (Smith, Jussim, & Eccles, 1999; Hinnant, O'Brien, & Ghazarian, 2009; de Boer, Bosker, & van der Werf, 2010), we hypothesized that the effects of teachers' expectations would dissipate across time. More specifically, the short-time effects (within one school year) of teachers' expectations on students' achievement were assumed to be stronger than the long-term effects (across several school years).

Second, we also investigated whether students' mathematics achievement had long-term effects on teachers' expectations. Because students' prior achievement has been found to be predictive of teachers' expectations (Trouilloud, Sarrazin, Martinek, & Guillet, 2002), we hypothesized that teachers base their expectations on students' achievement scores, even across several school years (performance-driven model).

Third, we examined whether the reciprocal effects would differ by students' ethnicity and SES. Following the studies of Jussim, Eccles and Madon (1996), McKown and Weinstein (2002) and Hinnant, O'Brien, and Ghazarian (2009) we hypothesized that the effects of teachers' expectations on students' achievement would be higher for students who are members of stigmatized groups (i.e., non-Belgian students and low SES students) compared to students from non-stigmatized groups (i.e., Belgian students and middle or high SES students). Concerning the effects of achievement on expectations, the opposite pattern was expected. Because teachers may base their expectations more on subjective information for students from stigmatized groups than for students from non-stigmatized groups (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010), we anticipated that the effects of students' achievement on teachers' expectations would be stronger for non-stigmatized students than for stigmatized students.

2. Method

2.1. Sample

The data were part of a large-scale longitudinal survey in primary education (i.e., SiBO which is the Dutch acronym for Trajectories through Primary Education) (Maes, Ghesquière, Onghena, & Van Damme, 2002). The project intended to describe and explain inter-individual differences in students' developmental trajectories during kindergarten and elementary school in Flanders (Dutch speaking part of Belgium). The SiBO project involved a nationally representative random sample of 122 schools which was extended with an oversampling of schools with a high percentage of low SES and/or ethnic minority students. The dataset in the current study comprised a sample of 5,250 students in 260 schools who were followed longitudinally across four school years i.e., kindergarten (final preschool year), Grade 1, Grade 4 and Grade 6. Students who changed schools between grades were followed in their new school and they were included in the analyses. Students who repeated a grade were excluded.

Of all students, 49.92 % were boys (n = 2621). At the start of kindergarten, students' average age was 5 years and 10 months. For most students (77.31%), both parents had the Belgian nationality at birth. Furthermore, 38.18% of the students' mothers completed higher education (college or university) and 38.06% had a high school diploma. Additionally, 4.53% of the mothers had no high school degree.

2.2. Instruments

2.2.1. Mathematics Achievement

Mathematics achievement tests were administered at four different time points: at the end of kindergarten (school year 2002-2003), at the end of Grade 1 (school year 2003-2004), at the end of Grade 4 (school year 2006-2007), and at the end of Grade 6 (school year 2008-2009). These tests were constructed for use in the SiBO-project. The raw scores were converted into scale scores with a common metric using Item Response Theory (Thissen & Wainer, 2001). That way, students' mathematics performance could be compared across different grades. The achievement test in kindergarten assessed skills in number sense such as comparing magnitudes, counting, and understanding mathematical concepts (Verachtert, Van Damme, Onghena, & Ghesquière, 2009). The tests in primary school also included items on mental arithmetic, number series, arithmetic word problems, measurement and geometry. Internal consistencies for all tests were high, with Cronbach's alpha ranging between .88 and .92.

2.2.2. Students' Characteristics

Students' socioeconomic status and ethnicity were retrieved from a questionnaire that parents completed in February 2003 (Reynders, Van Heddegem, Nicaise, & Van Damme, 2004). The SES of the child was a standardized composite measure and was composed of five indicators: the educational level of the mother and the father, the occupation of the mother and the father and the monthly household income

(Reynders, Nicaise, & Van Damme, 2005). The alpha value for this variable was .82. In order to test the possible moderating effects of students' SES, the variable was divided into the following three categories: low SES = -2.189 to -0.302 (M = -0.922, SD = 0.44) , middle SES = -0.299 to 0.502 (M = 0.096, SD = 0.24) and high SES = 0.505 to 2.175 (M = 1.054, SD = 0.39). Parents' nationality at birth was used as an indicator of students' ethnicity. Students were classified into one of two categories: both parents had the Belgian nationality at birth (Belgian students; 77.3%, coded as 0) and one of the parents or both parents had a foreign nationality (non-Belgian students; 22.7%, coded as 1).

2.2.3 Teachers' Expectations

Teacher questionnaires were used to assess the teachers' expectations (Cortois, Speybroeck, Van Damme, & Verschueren, 2010). Teachers were given a questionnaire concerning each child in their classroom at three different time points: in February in Grade 1, in February in Grade 4 and in February in Grade 6. All students had a different teacher at each time point. Following Dusek and Joseph (1983), who defined academic expectations as teachers' perceptions of students' performance, achievement, ability and attainment, the latent construct teachers' expectations was composed of three indicators , i.e., 'the child will be able to succeed in higher education', 'the child is performing better relative to his or her peers' and 'the child is highly gifted'. The items used in the current study correspond with items used before in teacher expectation research (Jussim & Eccles, 1992; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).The internal consistency of the different expectation constructs was found to be acceptable (Cronbach's alpha of .72, .77 and .78 in Grade 1, 4 and 6 respectively).

2.3. Data Analysis

The data were analysed by means of structural equation modelling (SEM) using Mplus 6.12 (Muthén & Muthén, 2011). Model estimation was based on a robust

maximum likelihood estimator (MLR) because our data contained missing values and deviated from normality. This estimator provides parameter estimates and standard errors that are robust to missing data and violations of normality. To account for the hierarchical structure of the data during the analyses, a school identification number of each child was used as a cluster variable. The models' goodness-of-fit were evaluated using a modified chi-squared statistic that is based on the Yuan-Bentler T2* test statistic (Y-Bχ^2) (Muthén & Muthén, 2007). However, because the χ^2 test statistic is sensitive to large sample size, additional goodness-of-fit measures were used, such as the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI). RMSEA and SRMR values of .05 or lower, and CFI values of .97 or higher indicate a good fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

A two-step procedure was followed including a measurement phase and a structural phase. First, a measurement model was fitted in which the latent constructs were related to their indicators. The teachers' expectation constructs were each represented by three indicators. The math achievement constructs were each represented by a single indicator with the error variance fixed to (1 – alpha) * total variance (Schumacker & Lomax, 2004). In the measurement model, we allowed the residuals of the same items measured over time to correlate to reduce bias in the stability paths (Marsh & Hau, 1996). Next, we tested for measurement invariance of the teachers' expectation measures to ensure that the meaning of the construct did not change over time (Möller, Retelsdorf, Köller, & Marsh, 2011). Therefore, an unconstrained measurement model was compared with a measurement model in which the factor loadings were constrained to be equal across different grades. As suggested by Cheung and Rensvold (2002) and by Cheng (2007), a difference in CFI of less than .01 and in RMSEA of less than .015 indicate that the two models do not differ significantly suggesting that the factor loadings are equal across the different time points.

Second, in the structural phase a full reciprocal model was fitted. This model represents the effects of students' achievement on teachers' expectations as well as

the effects of teachers' expectations on students' achievement over time, controlling for autoregressive effects. Specific indirect effects were tested using the IND command in Mplus. To evaluate the size of the effects, Cohen's effect size index f^2 was calculated with $f^2 \geq 0.35$ indicating a large effect, $f^2 \geq 0.15$ a medium effect and $f^2 \geq 0.02$ a small effect (Cohen, 1992). To examine whether the structural paths differed between the ethnicity and SES groups, multi-group modelling was used. Whit this technique, a constrained model in which all the structural coefficients are set equal across the groups is compared with a more unconstrained model in which some of the coefficients are allowed to vary across the groups. A significant scaled-χ^2-difference-test implies that there is a significant difference between the groups (Gustafsson & Stahl, 2000).

3. Results

3.1. Descriptive Statistics

Range, means, standard deviations and percentage missing values of the manifest variables can be found in Table 1. Correlations among the variables are presented in Table 2. The indicators are all significantly and, with the exception of students' ethnicity, positively related to each other.

Table 1. Descriptive Statistics

Measure	**Min.**	**Max.**	**M**	**SD**	**%**	**% missing**
ACH_K3	25.66	71.43	54.00	8.45		25.75
ACH_G1	42.16	86.35	69.76	7.59		15.28
ACH_G4	67.35	116.68	97.12	8.28		16.40
ACH_G6	80.05	130.57	106.95	8.27		16.91
HIGHED_G1	1	4	2.87	.90		19.49
HIGHED_G4	1	4	2.84	.93		18.10
HIGHED_G6	1	4	2.86	.95		22.46
RELACH_G1	1	3	2.40	.70		16.99
RELACH_G4	1	3	2.33	.73		18.70
RELACH_G6	1	3	2.29	.76		21.50
GIFTED_G1	1	6	2.15	1.21		16.36
GIFTED_G4	1	6	2.34	1.34		17.05
GIFTED_G6	1	6	2.31	1.27		21.09
SES	-2.19	2.17	.073	.89		19.41
ETHNICITY (minority)					22.69	22.59

Note. ACH_K3 = students' achievement at the end of kindergarten; ACH_G1 = students' achievement at the end of Grade 1; ACH_G4 = students' achievement at the end of Grade 4; ACH_G6 = students' achievement at the end of Grade 6; HIGHED_G1 = higher education predicted by the teacher in Grade 1; HIGHED_G4 = higher education predicted by the teacher in Grade 4; HIGHED_G6 = higher education predicted by the teacher in Grade 6; RELACH_G1 = relative achievement predicted by the teacher in Grade 1; RELACH_G4 = relative achievement predicted by the teacher in Grade 4; RELACH_G6 = relative achievement predicted by the teacher in Grade 6; GIFTED_G1 = giftedness predicted by the teacher in Grade 1; GIFTED_G4 = giftedness predicted by the teacher in Grade 4; GIFTED_G6 = giftedness predicted by the teacher in Grade 6; SES = students' socioeconomic status; ETHNICITY = percentage minority students.

Table 2. Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	ACH_K3														
2	ACH_G1	.639													
3	ACH_G4	.502	.612												
4	ACH_G6	.462	.570	.797											
5	HIGHED_G1	.555	.500	.467	.455										
6	HIGHED_G4	.460	.462	.600	.604	.603									
7	HIGHED_G6	.415	.421	.552	.625	.540	.669								
8	RELACH_G1	.494	.486	.411	.386	.692	.506	.448							
9	RELACH_G4	.400	.424	.590	.558	.533	.783	.614	.506						
10	RELACH_G6	.398	.442	.565	.624	.493	.652	.769	.459	.652					
11	GIFTED_G1	.322	.345	.326	.312	.459	.362	.325	.392	.325	.313				
12	GIFTED_G4	.317	.377	.466	.462	.402	.551	.449	.335	.496	.433	.356			
13	GIFTED_G6	.309	.358	.457	.519	.372	.455	.529	.303	.411	.503	.338	.471		
14	SES	.399	.326	.330	.364	.443	.418	.413	.243	.302	.324	.229	.252	.296	
15	ETHNICITY	-.338	-.204	-.234	-.182	-.181	-.178	-.149	-.104	-.144	-.115	-.049	-.091	-.073	-.295

Note. All coefficients are significant ($p < .001$). ACH_K3 = students' achievement at the end of kindergarten; ACH_G1 = students' achievement at the end of Grade 1; ACH_G4 = students' achievement at the end of Grade 4; ACH_G6 = students' achievement at the end of Grade 6; HIGHED_G1 = higher education predicted by the teacher in Grade 1; HIGHED_G4 = higher education predicted by the teacher in Grade 4; HIGHED_G6 = higher education predicted by the teacher in Grade 6; RELACH_G1 = relative achievement predicted by the teacher in Grade 1; RELACH_G4 = relative achievement predicted by the teacher in Grade 4; RELACH_G6 = relative achievement predicted by the teacher in Grade 6; GIFTED_G1 = giftedness predicted by the teacher in Grade 1; GIFTED_G4 = giftedness predicted by the teacher in Grade 4; GIFTED_G6 = giftedness predicted by the teacher in Grade 6; SES = students' socioeconomic status; ETHNICITY = percentage minority students.

3.2. Measurement Model

First, a measurement model was fitted with seven latent constructs (teachers' expectations in the middle of Grade 1, in the middle of Grade 4 and in the middle of Grade 6; students' achievement at the end of kindergarten, at the end of Grade 1, at the end of Grade 4 and at the end of Grade 6) and 13 indicators (three indicators measuring teachers' expectations and 1 indicator measuring students' achievement across the different time points). The measurement model yielded a good fit to the data (Y-Bχ^2 (39) = 169.78; RMSEA = .025; SRMR = .020; CFI = .991). The standardized factor loadings ranged from .52 to .92.

Next, to test whether factorial loadings were invariant across grades, an unconstrained model was compared with a model in which the factor loadings were constrained to be equal across the different time points. The fit of the constrained model was good (Y-Bχ^2 (43) = 196.74; RMSEA = .026; SRMR = .027; CFI = .990) and as indicated by differences in RSMEA (Δ = .001) and CFI (Δ = .001), the fit of this model did not differ significantly from the unconstrained model. Therefore we can conclude that the meaning of the latent constructs did not appreciably change over time.

3.3. Reciprocal Model

To examine the longitudinal reciprocal associations between expectations and achievement during elementary school controlling for achievement in kindergarten, a full reciprocal model was fitted. The goodness-of-fit indices were good (Y-Bχ^2 (39) = 169.78; RMSEA = .025; SRMR = .020; CFI = .991). However, this model could be trimmed as some of the paths were non-significant (Bentler & Mooijaart, 1989). This way, a more parsimonious model could be found. The fit of the trimmed model (Y-Bχ^2 (48) = 183.47; RMSEA = .023; SRMR = .022; CFI = .991) did not differ significantly from the fit of the full model (ΔSBS-χ^2 (9) = 16.08, p = .065), which indicated that trimming was allowed (Kline, 2005). Therefore, the trimmed model, presented in Figure 1, was chosen as our final model.

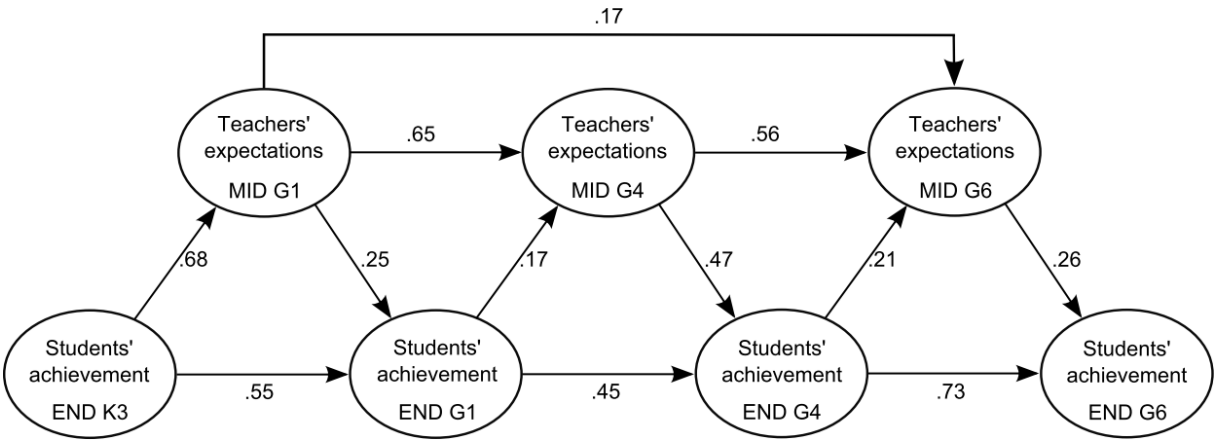

Figure 1. Reciprocal associations between teachers' expectations and students' achievement. For reasons of clarity, indicators of the latent constructs are not reported. All coefficients are standardized significant ($p < .001$). Students' achievement END K3 = achievement assessed at the end of kindergarten; Teachers' expectations MID G1 = expectations assessed in the middle of Grade 1; Students' achievement END G1 = achievement assessed at the end of Grade 1; Teachers' expectations MID G4 = expectations assessed in the middle of Grade 4; Students' achievement END G4 = achievement assessed at the end of Grade 4; Teachers' expectations MID G6 = expectations assessed in the middle of Grade 6; Students' achievement END G6 = achievement assessed at the end of Grade 6.

First, the reciprocal model showed that both teachers' expectations and students' achievement were stable across time. Students' achievement between Grade 4 and Grade 6 was the most stable ($\beta = .73$, $p < .001$, $f^2 = 1.14$), followed by teachers' expectations between Grade 1 and Grade 4 ($\beta = .65$, $p < .001$, $f^2 = .73$). Furthermore, teachers' expectations in Grade 1 also predicted expectations in Grade 6 both directly ($\beta = .17$, $p < .001$, $f^2 = .03$) and indirectly ($\beta = .36$, $p < .001$, $f^2 = .15$).

Second, concerning the longitudinal effects of teachers' expectations on students' mathematics achievement, the results revealed short-term direct effects within one school year. Teachers' expectations assessed in the middle of the school year predicted students' achievement at the end of the school year in Grade 1 ($\beta = .25$, $p < .001$, $f^2 = .064$), in Grade 4 ($\beta = .47$, $p < .001$, $f^2 = .29$) and in Grade 6 ($\beta = .26$, $p < .001$, $f^2 = .074$), controlling for students' prior achievement. There were no direct long-term effects of teachers' expectations on students' achievement. Nevertheless, the expectations assessed in the middle of Grade 1 predicted students' achievement at

the end of Grade 4 through several indirect paths, leading to a total effect (i.e., the sum of all direct and indirect effects) of β = .44 (p < .001, f^2 = .271). Similarly, teachers' expectations assessed in the middle of Grade 1 indirectly predicted students' achievement at the end of Grade 6 (total effect of β = .49, p < .001, f^2 = .313) and teachers' expectations assessed in the middle of Grade 4 indirectly predicted students' achievement at the end of Grade 6 (total effect of β = .52, p < .001, f^2 = .337). An overview of all the direct and indirect effects can be found in Table 3.

Table 3. Direct, Indirect and Total Effects of the Reciprocal Model presented in Figure 1

Outcome	Direct	Indirect	Total
		From Students' Achievement K3	
Teachers' Expectations G1	.68*	.00	.68*
Students' Achievement G1	.55*	.16*	.71*
Teachers' Expectations G4	.00	.56*	.56*
Students' Achievement G4	.00	.58*	.58*
Teachers' Expectations G6	.00	.55*	.55*
Students' Achievement G6	.00	.57*	.57*
		From Teachers' Expectations G1	
Students' Achievement G1	.25*	.00	.25*
Teachers' Expectations G4	.65*	.04*	.69*
Students' Achievement G4	.00	.44*	.44*
Teachers' Expectations G6	.17*	.48*	.65*
Students' Achievement G6	.00	.49*	.49*
		From Students' Achievement G1	
Teachers' Expectations G4	.17*	.00	.17*
Students' Achievement G4	.45*	.08*	.53*
Teachers' Expectations G6	.00	.21*	.21*
Students' Achievement G6	.00	.44*	.44*
		From Teachers' Expectations G4	
Students' Achievement G4	.47*	.00	.47*
Teachers' Expectations G6	.56*	.10*	.66*
Students' Achievement G6	.00	.52*	.52*
		From Students' Achievement G4	
Teachers' Expectations G6	.21*	.00	.21*
Students' Achievement G6	.73*	.05*	.78*
		From Teachers' Expectations G6	
Students' Achievement G6	.26*	.00	.26*

Note. All coefficients are standardized; * p < .001.

Third, we found that students' mathematics achievement predicted the teachers' expectations, controlling for students' prior achievement. Grade 4 teachers based their expectations on students' achievement in Grade 1 ($\beta = .17$, $p < .001$, $f^2 = .031$) and Grade 6 teachers based their expectations on students' achievement in Grade 4 ($\beta = .21$, $p < .001$, $f^2 = .045$).

3.4. Ethnic and Socioeconomic Differences

With respect to ethnic differences, multiple group analyses of the reciprocal model demonstrated that the structural paths were equal for Belgian and non-Belgian students (ΔSBS-χ^2 (60) = 67.12, $p = .241$).

The multiple group analyses concerning students' SES showed that there were differences present in the model (ΔSBS-χ^2 (120) = 393.25, $p < .001$). However, only one structural path differed between the SES groups. Teachers based their expectations more on previous achievement for middle SES students ($\beta = .63$, $p < .001$, $f^2 = .658$; ΔSBS-χ^2 (1) = 7.18, $p < .01$) or high SES students ($\beta = .63$, $p < .001$, $f^2 = .658$; ΔSBS-χ^2 (1) = 5.73, $p < .05$) compared to low SES students ($\beta = .54$, $p < .001$, $f^2 = .401$). All other paths did not differ significantly between the three SES groups.

4. Discussion

This study was meant to investigate the long-term reciprocal associations between teachers' expectations and students' mathematics achievement in elementary school. We also tested whether the associations would differ between Belgian and non-Belgian students and between low, middle, and high SES students.

4.1. Reciprocal Associations between Expectations and Achievement

The results of our seven-wave longitudinal reciprocal model first showed that teachers' expectations assessed in the middle of the school year predicted students' achievement at the end of the school year in Grade 1, 4 and 6 with an average

medium effect size of f^2 = .14. The higher the expectations of the teacher, the higher the achievement scores of students were at the end of the school year. This result concurs with the general findings reported in literature concerning the short-term effects of teachers' expectations (Jussim & Harber, 2005).

Next, in line with the expectations-driven model (Goldenberg, Gallimore, Reese, & Garnier, 2001), the findings revealed long-term indirect effects of teachers' expectations on students' achievement. The expectations of teachers in Grade 1 indirectly predicted students' achievement at the end of Grade 4 (medium effect size of f^2 = .27) and at the end of Grade 6 (medium effect size of f^2 = .31). Likewise, teachers' expectations in Grade 4 predicted students' achievement indirectly at the end of Grade 6 (medium effect size of f^2 = .34). However, these results do not support previous findings concerning the long-term effects of teachers' expectations indicating a dissipation or stabilizing process (Smith, Jussim, & Eccles, 1999; Hinnant, O'Brien, & Ghazarian, 2009; de Boer, Bosker, & van der Werf, 2010). We found that the effect of teachers' expectations on students' achievement accumulated across several school years. For example, while teachers' expectations in Grade 1 had an small effect (f^2 = .06) on students' achievement at the end of Grade 1, the effect size on students' achievement became medium (f^2 = .27) at the end of Grade 4 and approached a large effect size (f^2 = .31) at the end of Grade 6. These results can be explained in the context of the repeated belief model described by Madon, Willard, Guyll, Trudeau and Spoth (2006). Combined teachers' expectations assessed at different time points affected students' subsequent achievement outcomes. The expectations of teachers in later grades thus mattered above and beyond the expectations of teachers in earlier grades. Furthermore, the results importantly point to a transfer of expectations across grades and across teachers. Indeed, we found strong stability effects of teachers' expectations. Earlier expectations in Grade 1 even predicted expectations up to five years later in Grade 6, both directly (small effect of f^2 = .03) and indirectly through teachers' expectations in Grade 4 (medium effect of f^2 = .15). This stability can be explained by the fact that teachers interact and dialogue with colleagues and it shows the need for researchers to take into consideration

expectations developed later in time when studying the long-term effects of teachers' expectations on students' outcomes.

Besides the long-term effects of teachers' expectations on students' mathematics achievement, the study results demonstrated that students' achievement also predicted teachers' expectations across grades with an average small effect size of $f^2 = .04$. This finding supports the performance-driven model of Goldenberg, Gallimore, Reese and Garnier (2001) and provides further evidence for the influence of students' achievement on teachers' expectations (Trouilloud, Sarrazin, Martinek, & Guillet, 2002).

In general, we found evidence for long-term reciprocal associations between expectations and achievement (expectations predicted achievement as well as achievement predicted expectations). However, our results seemed to be in favour of the expectation-driven model. The long-term effects from teachers' expectations to students' achievement (average medium effect size of $f^2 = .31$) were larger than the long-term effects from students' achievement to teachers' expectations (average small effect size of $f^2 = .04$). These results corroborate the findings of Crano and Mellon (1978) and indicate that the effects of expectations on achievement can indeed be powerful in some conditions, i.e., by accumulation across time.

4.2. Ethnic and Socioeconomic Differences

Concerning the differential effects of students' ethnicity and SES, we only found that the effect of students' achievement in kindergarten on teachers' expectations in Grade 1 differed by students' SES. In line with our hypothesis, the effect was somewhat stronger for students from middle or high socioeconomic backgrounds than for students from low socioeconomic backgrounds. Grade 1 teachers based their expectations more on students' achievement in kindergarten for students who are members of non-stigmatized groups. This result should however be interpreted with caution. The effect of students' achievement in kindergarten on teachers' expectations in Grade 1 could be overestimated as we did not control for teachers' expectations in kindergarten nor for students' achievement at the beginning of Grade

1. It might be that the differences we found disappear after taken into account previous expectations in kindergarten or prior achievement in Grade 1.

In contrast to our hypothesis and the general findings in literature (Jussim, Eccles, & Madon, 1996; McKown & Weinstein, 2002; Hinnant, O'Brien, & Ghazarian, 2009) no differences were found between the ethnicity and SES groups for the effects of expectations on achievement. However, these results are consistent with the research performed in the Netherlands (de Boer, Bosker, & van der Werf, 2010; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010) where the authors also failed to find moderation effects of students' ethnicity.

4.3. Limitations

Some limitations should be taken into account when interpreting our findings. First, it is always possible that other variables that were not assessed in the current study, may affect both predictors and outcomes (omitted variable problem). The effects of teachers' expectations on students' later achievement outcomes may be biased because we did not take into consideration other important predictor variables of teachers' expectations. For example, students' final grades could be of greater importance in predicting teachers' expectations than students' previous test scores. Another possibility is that teachers' expectations may vary according to certain teacher characteristics, such as their age or their ethnic or social background. Future research should investigate these issues further more. A second limitation involves the measurements of certain items. Although we found that the items measuring teachers' expectations comprise one underlying latent construct, we did not explicitly assess whether teachers have high or low expectations for their students. Instead, the items are measuring present and future perceptions towards students rather than real expectations. Furthermore, the absence of differences between Belgian and non-Belgian children in the associations between expectations and achievement could be due to our measurement of students' ethnicity. We used parents' nationality at birth as an indicator of ethnicity. However, some studies operationalize ethnicity as different ethnic groups. Conceptualizing ethnicity as such might possibly lead to

other results concerning the moderation effects in the current study. Finally, concerning students' achievement outcomes, we only investigated mathematics achievement. As such, the present results cannot be generalized to associations between teachers' expectations and other students' outcomes, such as their language achievement.

5. Conclusion

By means of a seven-wave longitudinal reciprocal structural equation model, we investigated the long-term associations between teachers' expectations and students' mathematics achievement during elementary school (n=5,250). The results showed that teachers based their expectations on students' prior achievement. Furthermore, teachers' expectations predicted students' later achievement within one school year as well as across several school years through a transfer of expectations of different teachers over time. Finally, the associations between expectations and achievement during elementary school were not different between Belgian and non-Belgian students and between low, middle, and high SES students.

CHAPTER 6

General Discussion

The present doctoral dissertation focused on important antecedents, consequences and moderators of teachers' expectations with respect to ethnic minority students and students from lower socioeconomic backgrounds in a large representative sample of Flemish pupils. Four studies were carried out in order to address existing gaps in the teacher expectation research knowledge base. The final chapter of this doctoral project comprises a summary and discussion of the main research findings; some limitations; and suggestions for future research.

1. Summary

By means of an integrated moderated mediation SEM model, the first study revealed that teachers' expectations in kindergarten mediated the association between students' SES and their later language and math achievement, controlling for students' ethnicity, prior achievement and gender. Teachers based their expectations on students' socioeconomic background and these expectations in turn affected students' later achievement outcomes. Furthermore, students' ethnicity moderated this mediation effect of teachers' expectations with respect to math outcomes. The role of teachers' expectations in mediating the relation between students' SES and math outcomes was somewhat stronger for majority children than for minority children.

The second study showed that teachers had higher expectations for girls and students with a higher SES than for boys and students with a lower SES, controlling for students' prior achievement. The multilevel regression analyses also demonstrated that, in general, the expectations were higher in classes with more low-SES students than in classes with more high-SES students. Furthermore, teachers expected more from minority students when these students belonged to classes with a larger proportion of minority students than when these students belonged to classes with a larger proportion of majority students.

By using a latent sum and difference SEM model, the third study demonstrated that teachers' and parents' expectations in kindergarten were, both independently and congruently, associated with students' achievement, controlling

for their prior achievement. These associations were most pronounced for children from lower socioeconomic backgrounds. Furthermore, if teachers and parents had different expectations, the effect of the parents predominated.

In the fourth study, the results of a longitudinal reciprocal SEM model pointed towards direct effects of teachers' expectations on students' achievement within one school year and to indirect effects across several school years through a transfer of expectations of different teachers over time. The associations between expectations and achievement during elementary school did not differ for majority and minority students nor for different SES groups.

2. Discussion

In order to understand the complex processes that link teachers' expectations to the characteristics and achievement outcomes of students at risk, an ecological framework was adopted (Bronfenbrenner, 1986). The present doctoral dissertation focused on different microsystems of the classroom context and the home context which may (re)act on students' outcomes. For example, students' achievement was found to be associated with the expectations of teachers (study 1, 3 and 4) and with the expectations of parents (study 3). Next, interacting microsystems were also addressed. Results pointed to associations between teachers' expectations and classroom composition (study 2) as well as to associations between teachers' expectations and parents' expectations (study 3).

2.1. Antecedents of Teachers' Expectations

Research addressing the antecedents of teachers' expectations has indicated that teachers, in general, have lower expectations for ethnic minority students and students with a lower SES compared to ethnic majority students and students with a higher SES (Tenenbaum & Ruck, 2007). The results of the studies in the doctoral dissertation partially confirm these findings. The expectations of teachers in kindergarten were indeed lower for students with a lower SES than for students with

a higher SES (study 1, study 2). However, in contrast to what was assumed, ethnic minority students were not judged less favourably compared to ethnic majority students. In some conditions, teachers even expected more from these students. For example, compared to ethnic majority students, the expectations towards ethnic minority students were larger when these students had a low SES (study 1) and when they belonged to classes with more minority students (study 2). These results may be due to a "specialization effect" (Peetsma, van der Veen, Koopman, & van Schooten, 2006). Teachers may have developed more expertise in teaching thereby making more effort to improve the progress of ethnic minority students. This specialisation effect may also explain why teachers had higher expectations in classes with a higher percentage of low-SES students (study 2). Although the expectations were lower for the individual low-SES student, teachers did not lower their standards but they adapted their beliefs when these students belonged to classes with more low-SES students.

2.2. Consequences of Teachers' Expectations

Teacher expectation research has shown that, in terms of effect sizes, the effects of expectations are rather small (Jussim & Harber, 2005). The results of the present studies concurred with this finding. Teachers' expectations in the middle of the school year predicted students' end-of-year achievement with an average small effect size of $f^2 = .03$ in kindergarten and with an average medium effect size of $f^2 = .14$ in elementary school. Nevertheless, the results indicated that teachers' expectations could become more pronounced for certain students or under some conditions.

First, the effect of teachers' expectations on students' achievement in kindergarten was larger for majority students than for minority students (study 1). In contrast to what was expected, teachers' expectations thus seemed less influential for minority students compared to majority students. A possible explanation for this result may be that most teachers in Flanders belong to the ethnic majority group themselves. They may be better at encouraging and praising children with a similar ethnic background as their own. As a result, teachers' influences on majority students

might become larger. Nevertheless, the data of the fourth study indicated that in elementary school, the effects of teachers' expectations did not differ between minority and majority students. Although this finding contradicted previous research in the U.S. (McKown & Weinstein, 2002), it was consistent with the research performed in the Netherlands (de Boer, Bosker, & van der Werf, 2010). A positive consequence is that majority and minority students thus seemed to be equally affected by the expectations in elementary school. On the other hand, the minority students seemed to have lost the 'advantage' they had in kindergarten over majority students. The lack of moderation effects may however also ensue from the complexity of the longitudinal reciprocal model used in study 4. It might be that moderation effects would have occurred when the focus would have been on cross-sectional effects within one grade only.

Second, teachers' expectations in kindergarten had stronger effects on students' achievement for students with a lower SES compared to students with a higher SES (study 3). This result was in line with the literature (Jussim, Eccles, & Madon, 1996) and indicated that students from stigmatized social groups indeed seemed to be more susceptible to the effects of teacher's expectations than students from non-stigmatized social groups. Again, this differential effect disappeared in elementary school (study 4). No differences were found between the different SES groups in the associations between teachers' expectations and students' achievement outcomes. Teachers' expectations thus equally affected the achievement of low and high SES students in elementary school. This result may be explained by age-related factors. In kindergarten, low-SES students are possibly more depended on their teachers than high-SES students and therefore influences of teachers' expectations may be larger. With advancing age, these students become more aware of their environment and other influences, such as peers, also become important. Thereby the differences between low-SES end high-SES students concerning teacher' expectations may be minimized in elementary school.

Third, the effects of teachers' expectations on students' achievement became larger when teachers and parents had the same expectations (study 3). The results of the third study demonstrated that teachers' and parents' expectations were

congruently associated with students' achievement. This finding corroborated previous research (Benner & Mistry, 2007) and indicated that higher or lower adult expectations may have generative or disruptive consequences for children. Furthermore, it was found that if teachers and parents had differential expectations, the effect of the parents predominated. That way, parents may counterbalance the negative expectations of teachers and protect their children from some of the influences teachers have on achievement.

Fourth, the last study indicated that the short-time (direct) effects of teachers' expectations on students' achievement were less strong than the long-term (indirect) effects, suggesting that the effects of teachers' expectations accumulated over time (Madon, Willard, Guyll, & Scherr, 2011). Following the repeated belief model (Madon, Willard, Guyll, Trudeau, & Spoth, 2006), these results were explained by a process of transfer of teachers' expectations across different teachers across time. The expectations of teachers in later grades thus seemed to matter above and beyond the expectations of teachers in earlier grades.

2.3. An Integrated Model

In order to address whether teachers' expectations contributed to the achievement gap between lower SES and higher SES students, an integrated SEM model was fitted (study 1). Teachers had lower/higher expectations for students from lower/higher socioeconomic backgrounds and these expectations led to lower/higher achievement. Teachers' expectations may thus be seen as a possible link between students' SES and their outcomes thereby playing a role in exacerbating existing individual differences. This finding could be understood in the context of the ''Matthew effect'' (Merton, 1968) which refers to a process of cumulative advantage or disadvantage following initial advantage or disadvantage (Morgan, Farkas, & Hibel, 2008). Due to certain family circumstances, children with a lower socioeconomic background arrive at kindergarten with lower levels of competence (Farkas, 2003). In turn, these children are less rewarded for their knowledge and more impeded by their teachers than children with a higher socioeconomic

background (Walberg & Tsai, 1983). As a result, lower socioeconomic background children tend to fall even further behind over time (Farkas, 2003).

3. Limitations and Suggestions for Future Research

The findings in the present doctoral dissertation should be understood in the context of some limitations.

First, it should be noted that the correlational design of the studies in the doctoral dissertation does not permit drawing causal inferences. Although the use of correlational data can be advantageous in terms of ecological validity, it is not possible to determine whether the independent variable caused changes in the dependent variable or the dependent variable caused changes in the independent variable (Madon, Willard, Guyll, Trudeau, & Spoth, 2006). However, by using a (short-time) longitudinal design, a temporal ordering was present, at least concerning the effects of teachers' expectations on students' future achievement outcomes. Because teachers' expectations were measured in the middle of the school year and students' achievement at the end, expectations literally preceded achievement.

Second, it is always possible that other variables that were not assessed in the current studies, may affect both predictors and outcomes (omitted variable problem). For example, the effects of teachers' expectations on students' later achievement outcomes may be biased because we did not take into consideration other important predictor variables of teachers' expectations. Teachers' expectations may vary according to certain teacher characteristics, such as their ethnic or social background. These characteristics may render teachers more susceptible to raise or lower their expectations. Furthermore, research has shown that when teachers and students had a similar ethnic background, the achievement scores of students were positively affected (Dee, 2004). Therefore, it might be expected that when teachers belong to an ethnic minority or a lower SES group themselves, they will play a lesser role in exacerbating the individual differences between students with the same ethnic or social background. Future research should investigate this issue.

Next, the present research focused on students' academic achievement as an outcome variable. As such, the present results cannot be generalized to associations between teachers' expectations and other students' outcomes, such as certain socioemotional or psychosocial factors. It would be interesting to examine whether higher teachers' expectations would also be associated with higher social or emotional well-being and whether differential effects for students at risk would emerge.

Another important factor that could influence the educational outcomes of students, is the student's expectation of his own future academic performance. Students are indeed no passive recipients of information, but mentally active learners (Ma, 2001). However, there are only a few studies that investigated the impact of students' self-expectations. Research from Kuklinski and Weinstein (2001) provided support for indirect effects of teacher expectations on ending achievement through students' self-expectations, but only in Grade 5 of elementary school. Rubie-Davies (2006) demonstrated that the self-perception of students, rather than their self-expectations, increased after one academic year when having high-expectation teachers. On the contrary, the academic self-perception of students whose teachers had low expectations, decreased dramatically after one year. Another student expectation study is that of Ma (2001). With a survival analysis, he found that students with high future expectations for themselves were more likely to participate in advanced mathematics. Furthermore, student effects were independent of peer and teacher effects. However, the author did not investigate the influence on later student performance.

A third limitation concerns the measurement of certain variables in the studies. For example, the items measuring 'teachers' expectations' did not explicitly assess whether teachers had high or low expectations for their students. Instead, they covered present and future perceptions towards students rather than real expectations. However, teacher expectation literature in general contains no agreed-on items for measuring expectations. This possibly follows from the fact that teachers' expectations are not uniquely defined. In an attempt to overcome this problem, the present studies included items that have been used by various authors

before (Jussim & Eccles, 1992; van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010). Although we found that the items probed a single underlying construct (mean Cronbach's alpha of .83 in kindergarten and .78 in elementary school), the lack of an unique operationalization for teachers' expectations hinder the generalizability and comparability with other studies in the domain. Next, parents' nationality at birth was used as an indicator of students' ethnicity. Most studies however operationalize ethnicity as different ethnic groups. Conceptualizing ethnicity as such might lead to other results than those found in the current studies.

4. Final Conclusion

The present doctoral dissertation investigated important antecedents, consequences and moderators of teachers' expectations with respect to ethnic minority students and students from lower socioeconomic backgrounds in Flanders. It can be concluded that teachers had differential expectations concerning their students in kindergarten and in elementary school. Furthermore, teachers' expectations in turn affected students' achievement outcomes. Although in general the effects were rather small, they were larger for students from lower socioeconomic backgrounds, indicating that expectations may reinforce social inequalities. Because stigmatization is known to play a part in social inequalities, it is of great importance to keep on identifying those factors that provoke and maintain stereotypic thinking, so that all students can be academically successful. The effects of teachers' expectations also became larger when teachers' expectations matched the expectations of parents and by means of a transfer of expectations of different teachers over time. It is important that both education policy makers and researchers continue to highlight the crucial role of teachers and their expectations in guiding young students throughout their school career, especially for ethnic minorities and students from lower socioeconomic backgrounds.

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