



Primary teachers' perceptions that impact upon track recommendations regarding pupils' enrolment in secondary education: a path analysis

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Abstract

In less meritocratic educational systems, teachers' decision-making processes and their perceptions of pupils are essential for the practice of pupils' allocation at transitory moments. The present study investigated how perceptions held by teachers impact upon teacher track recommendations regarding pupils' enrolment in secondary education in Flanders. By means of structural equation modelling, we studied the hypothesised impact of pupils' cognitive (i.e. maths skills, language skills and technical skills) and non-cognitive (i.e. school-appropriate behaviours and personal-social behaviours) attributes and of teacher–pupil relationships, as perceived by the teachers. Additionally, we addressed the hypothesised (mediated) impact of perceived parental involvement in education and parents' socio-economic status (SES) and ethnicity, as social and cultural parental background characteristics. Results show that teacher track recommendations are best directly predicted by pupils' perceived maths skills. Also pupils' perceived school-appropriate behaviours and parents' SES substantially and directly predict teacher track recommendations. Teacher track recommendations are further indirectly affected by perceived parental involvement in education, parents' SES and parents' ethnicity.

Keywords Teacher perceptions · Teacher expectations · Track recommendations · Educational choice · Primary education · Structural equation modelling

1 Introduction

For many decades it has been claimed that teacher cognitions, also referred to as teacher perceptions, impact upon teacher behaviour, including teachers' assessment and allocation of pupils at key transition points (e.g. Ashton 2015; Fang 1996; Fives and Buehl 2012). This particularly applies to the educational system of Flanders (the

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Dutch-speaking region of Belgium) at the transition to secondary education, considering the crucial role of teachers' perceptions, as expressed in their track recommendations, at this transition. Knowing this, one can wonder exactly what perceptions form the basis of teachers' advice regarding pupils' enrolment in secondary education. Unfortunately, a lack of knowledge on this topic still exists. Little research has specifically inquired into the perceptions upon which teacher track recommendations are based. Moreover, existing research on this topic is characterised by some major restrictions. Previous research into teacher perceptions, mainly within the field of expectancy research [cf. the Pygmalion Study of Rosenthal and Jacobson (1968)], is traditionally restricted to a single focus on teachers' perceptions of pupils and, in particular, of cognitive pupil attributes (i.e. academic performance and abilities) (e.g. Jussim 2017; Jussim and Harber 2005). Nonetheless, as more recently argued by Timmermans et al. (2016), despite the acknowledged importance of teachers' perceptions of non-cognitive pupil attributes (e.g. Farrington et al. 2012; Farkas 2003), little is known about the impact of these perceptions on allocation. Hence, in order to capture the wide range of influencing teachers' perceptions of pupils in the context of allocation, we must consider teachers' perceptions of both cognitive and non-cognitive pupil attributes.

Next, generally speaking, prior research has paid only a little attention to the contextual nature of teacher perceptions. Nevertheless, Fang (1996) and Fives and Buehl (2012) stated that teacher perceptions are resulting from interactions with the context in which teachers operate, indicating their contextualised nature. At the same time, Fulmer et al. (2015) pointed out levels of contextual factors affecting teachers' assessment practices, suggesting that teacher perceptions other than that of the pupils also need to be considered in the context of allocation. First, within the immediate context of the classroom (i.e. micro-level), alongside pupils' individual attributes, the model points to the influence of social factors related to teacher–pupil relationships. Second, at the meso-level (i.e. outside of the classroom), the model points to the influence of parents' characteristics, such as their involvement in education and background characteristics. Although there is a general consensus that teachers' expectations of pupils are fairly accurate (Jussim 2017), a substantial amount of research points to the biased nature of these expectations towards family SES and ethnicity (e.g. Machts et al. 2016; Ready and Wright 2011; Südkamp et al. 2012). Logically, biased teacher expectations may result in biased teacher track recommendations. Boone and Van Houtte (2013b), for instance, suggest that rather than taking parents' SES consciously into account, teachers emphasise specific non-cognitive pupil attributes that are considered to be unequally distributed across social classes, when advising pupils. This way, working class pupils are generally disadvantaged, because these non-cognitive attributes, such as punctuality, seem typical of middle class pupils [cf. the cultural reproduction theory of Bourdieu and Passeron (1977)]. Furthermore, knowing that also parental involvement is found to be related to social class, the association between parents' background characteristics and involvement cannot be ignored (e.g. Bakker et al. 2007; Hoover-Dempsey et al. 2005; Lareau 2000; Wiggan 2007). Consequently, it is not surprising that working class pupils whose parents generally are less involved in their children's education would be, for instance, less punctual with regard to school work. In brief,

we also must consider the impact of teachers' perceptions of parental involvement in education and parents' SES and ethnicity on allocation by teachers. Moreover, we must consider the possibility that these teacher perceptions and parents' background characteristics affect teacher track recommendations indirectly, that is, through the impact of teachers' perceptions of pupils.

To sum up, the present study addresses the influencing teacher perceptions of teacher track recommendations regarding pupils' transition to secondary education in Flanders. In doing so, the present study adds to the body of knowledge on the mechanisms of teachers' allocation processes and their interrelatedness with teacher perceptions. We hypothesise an impact of teachers' perceptions of pupils' cognitive and non-cognitive attributes on teacher track recommendations. In acknowledgment of the contextual nature of both teacher perceptions and assessment practices, we further hypothesise an impact of teacher–pupil relationships and parental involvement, as perceived by the teachers, and of parents' SES and ethnicity. The present study aims at unravelling these interrelationships, as described in the following two research questions:

1. What is the impact of teachers' perceptions of pupils' cognitive and non-cognitive attributes and of teachers' perceptions of their relationships with pupils on teacher track recommendations?
2. What is the impact of teachers' perceptions of parental involvement in education and parents' SES and ethnicity on teacher track recommendations, and to what extent is the impact of these teacher perceptions and parental background characteristics mediated by the other teacher perceptions?

2 Conceptual framework

In this section, we will explore the central concepts discussed in the introduction in more detail. A visual representation of the hypothesised relationships between the concepts is presented in Fig. 1.

2.1 Teacher track recommendations in the Flemish educational system

Contrary to meritocratic educational systems (e.g. the United States and Great Britain), in which pupils' allocation is based on their previous performance in

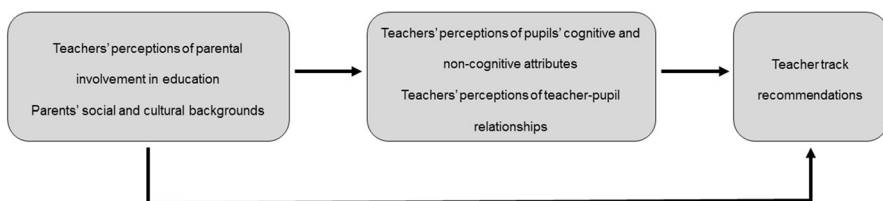


Fig. 1 Conceptual model

standardised tests, Flanders makes no use of binding, nationwide standardised tests at the end of primary education. As a result, pupils are commonly allocated to secondary education on the basis of teachers' perceptions of pupils' academic abilities and potential, as expressed in the teacher's track recommendation (e.g. Eurydice 2011; Gorard and Smith 2004; Penninckx et al. 2011; Van Petegem 2005). Clearly, in the highly decentralised and liberal educational system of Flanders, teachers' perceptions of pupils, in terms of track recommendations, are crucial for allocation (e.g. Boone and Van Houtte 2013a, b; Van Houtte et al. 2013).

In Flanders, most pupils make the transition to secondary education at the age of 12. The tracking structure is officially regulated and manifests itself at an early stage. Secondary education is divided into three grades (each of 2 years) characterised by increasing levels of differentiation (for an overview, see Pustjens et al. 2008). In the first grade, pupils can choose between two streams that are considered to be broad and comprehensive. The majority of pupils enter the A-stream, which proposes a common curriculum supplemented with optional courses to prepare pupils for an academic education. The B-stream provides education for pupils who are considered to be less suitable for academic tuition and for those who did not obtain a primary education certificate, in preparation for vocational secondary education (Department of Education and Training 2008). In this study, in line with the structure of the Flemish educational system, we address teacher track recommendations in terms of the first study choice options at the beginning of secondary education. Therefore, we consider whether teachers recommended their pupils to enrol in the A-stream or the B-stream and, within the A-stream, whether teachers recommended enrolment in more academically (i.e. Latin and modern sciences) or less academically (i.e. technology and arts) oriented optional courses.

Schools themselves determine how to fill up these optional courses, mainly in terms of extra courses of classical languages not included in the common curriculum (e.g. Latin), extra theoretical courses (e.g. modern sciences) or extra courses of technology and expression (e.g. arts). The optional courses of the A-stream can be considered as forerunners for the different educational tracks in the second and third grade: general secondary education (GSE: broad curriculum), technical secondary education (TSE: technical subjects), artistic secondary education (ASE: art practices) and vocational secondary education (VSE: vocational-oriented) (Department of Education and Training 2008). The tracks, as well as the preceding optional courses, are commonly valued differently. Compared to TSE and ASE, which occupy an intermediate position, a relatively higher status is associated with GSE and a relatively lower status with VSE. Pupils attending GSE are more likely to attend higher education and enter "high"-status occupations. Theoretically, it is possible to switch backwards and forwards between the different tracks. In practice, however, pupils mostly "fall back" from GSE to TSE or ASE to VSE, resulting in a cascade system. Furthermore, as mentioned earlier, also the preceding optional courses of the A-stream are commonly considered to vary from less to more academically oriented (Department of Education and Training 2008).

2.2 Teacher perceptions influencing teacher track recommendations

2.2.1 Teachers' perceptions of pupils' cognitive and non-cognitive attributes

Following the long tradition of teacher expectancy research (e.g. Jussim 2017; Jussim and Harber 2005), we hypothesise an impact of teachers' perceptions of pupils' cognitive attributes on teacher track recommendations. Also, according to Farrington et al. (2012) and Farkas (2003) stating that teachers' perceptions of pupils' non-cognitive attributes are just as important, we hypothesise an impact of these teacher perceptions on teacher track recommendations. In their exploratory study on allocation by Flemish teachers, Boone and Van Houtte (2013b) concluded that teachers take into account non-cognitive characteristics of pupils that are important for school success, such as the ability to plan, when advising pupils. In order to define the crucial cognitive and non-cognitive attributes of pupils in the context of allocation, we build on Kornblau's (1982) conceptual framework of pupils' teachability. This theoretical concept refers to the perceptions held by teachers about the attributes that characterise "idealised teachable" pupils, which, in turn, indicate teachers' ideas about pupils' abilities to meet educational expectations (Kornblau 1982; Van Houtte 2004). Captured in the Teachable Pupil Survey as developed by Kornblau (1982), 33 pupil attributes were identified and categorised in the following three dimensions: pupils' cognitive-motivational behaviours (e.g. bright and rational thinking), school-appropriate behaviours (e.g. able to begin and complete classroom tasks) and personal-social behaviours (e.g. empathetic and honest).

In this study, we address the impact of teachers' perceptions of pupils' cognitive attributes on teacher track recommendations in terms of three core academic skills (i.e. "maths skills", "language skills" and "technical skills") (cf. cognitive-motivational behaviours). These skills make up an important part of the final attainment levels of primary education in Flanders, which are the minimum goals that the Flemish government considers necessary and achievable at the level of primary education (Flemish Department of Education and Training 2017). Additionally, we address the impact of teachers' perceptions of nine non-cognitive attributes of pupils on teacher track recommendations, categorised as school-appropriate behaviours (i.e. "ability to plan", "independent", "alert", "motivation to learn", "follows teachers' directions" and "mature") and personal-social behaviours (i.e. "honest", "friendly" and "considerate of others"). We selected these specific non-cognitive attributes based on the fact that they received the most agreement among the teachers included in the Kornblau (1982) study in terms of "teachable" pupils. In other words, as perceived by the teachers, both pupils' school-appropriate and personal-social behaviours seem the most desirable in this regard.

2.2.2 Teachers' perceptions of teacher-pupil relationships

Supportive relationships between teachers and their pupils become increasingly important as pupils progress through school (McGrath and Van Bergen 2015). In particular at the transition to secondary education, supportive teacher-pupil relationships are crucial, given the challenges presented by secondary schools compared

to primary schools (e.g. less personal and more evaluative structures) (Davis 2006). Three theoretical perspectives on teacher–pupil relationships are dominant in the study field (Davis 2003). Whereas the attachment perspective approaches teacher–pupil relationships as extensions of parent–child relationships (cf. the attachment theory of Bowlby and Ainsworth, as cited in Bretherton (1992)), the socio-cultural perspective approaches teacher–pupil relationships as a reflection of the interpersonal culture of classrooms, schools and society (cf. the developmental systems theory of Ford and Lerner (1992) and Sameroff (1995)). Unlike these two viewpoints, the motivational perspective highlights teacher–pupil relationships as embedded in the educational context. Supportive teacher–pupil relationships promote pupils’ motivation and learning through supportive instructional and affective classroom contexts driven by the teacher, in which the pupils’ need for autonomy, competence and relatedness is satisfied (cf. the self-determination theory of motivation of Deci and Ryan (1985)).

Each approach holds a unique conception of what constitutes a supportive relationship between teachers and pupils and of its effects. Taking the three approaches together, there is ample evidence that the quality of teacher–pupil relationships is fundamental for various pupils’ educational outcomes, that is, the social, emotional, behavioural and academic development (e.g. McGrath and Van Bergen 2015; Pianta et al. 2003). Similar to the cognitive and non-cognitive pupil attributes, as discussed above, these outcomes are assumed to play a role in teachers’ decisions regarding pupils’ enrolment in secondary education. Therefore, we hypothesise an impact of teachers’ perceptions of teacher–pupil relationships on teacher track recommendations. Building on all three dominant theoretical approaches, we do this by focusing on the perceptions held by teachers of the overall quality of their relationships with pupils.

2.2.3 Teachers’ perceptions of parental involvement in education

Alongside pupils and teachers, parents actively and jointly take part in the process of making educational choices regarding the secondary education of their children (e.g. Fallon and Bowles 1998; Gorard 1999). Parents’ engagement can be seen as a logical consequence of their participation in the overall development of their children, referring to the extent of parental involvement in education (Castro et al. 2015). Given the fairly young age of children at the time of transition to secondary education, having parents who are positively involved can be of great importance. It has in fact been well documented that the educational involvement of parents influences their children’s school success, more specifically in terms of pupils’ academic achievement (e.g. Castro et al. 2015; Hill and Tyson 2009; Ma et al. 2016). Moreover, parental involvement has been associated with other indicators of school success, such as lower retention rates, and with pupils’ psychological processes and attributes that support school achievement, such as pupils’ motivation (Hoover-Dempsey et al. 2005). Comparable to the earlier mentioned pupils’ cognitive and non-cognitive attributes and the outcomes of supportive teacher–pupil relationships, we can assume that these outcomes of parental involvement in education are also taken into consideration by teachers when allocating pupils. Therefore, we hypothesise

an impact of teachers' perceptions of parental involvement in education on teacher track recommendations. According to the typology of Epstein (1987), which is a theoretical model often used to describe the main types of parental involvement, teachers can be informed about the extent of parental involvement through parents' participation in the school (e.g. participation in decision-making processes), parents' communication with the school (e.g. attendance of teacher-parent conferences) and home-based behaviours and educational activities (e.g. helping with homework). Logically, the latter are less visible to teachers and, as stated by Bakker et al. (2007), teachers' perceptions of this type of parental involvement are mostly deducible from information on parents' participation in and communication with the school.

The literature shows us the multifaceted and multidimensional nature of the concept, involving conceptual difficulties for researchers. Generally speaking, parental involvement can be considered as the active participation of parents in all aspects of their children's social, emotional and academic development (Castro et al. 2015). In line with the multidimensionality of the concept, we consider this broad definition, adopting a holistic view on parental involvement, to be the most accurate. Consequently, this study addresses the perceptions held by teachers about parental involvement in general.

2.3 Parents' SES and ethnicity affecting teacher track recommendations

In many European countries with early tracking systems, research has shown that the transition to secondary education is influenced by the social and cultural backgrounds of pupils and their parents (e.g. Boone and Van Houtte 2013a; Ditton and Krusken 2006; Duru-Bellat 2015; Jackson et al. 2012; Jaeger 2009; Kloosterman et al. 2009). In this study, we consider the impact of parents' SES and ethnicity on teacher track recommendations as social and cultural background measures. Irrespective of their achievement, children from working class parents are over-represented in less academic tracks of secondary education. Moreover, the social class impact is the strongest at the first major transition to secondary education, as stated by Hansen (1997).

The causes of inequality in educational opportunity can be seen as twofold. First, working class pupils and parents opt less often for the more academic tracks in secondary education, compared to high SES pupils and parents. From a sociological point of view, explanations for these class differentials in education are generally sought in the cultural reproduction theory, social capital theory and rational action theories (for an overview, see Boone and Van Houtte 2013a). Second, teacher track recommendations, influenced by teachers' expectations of pupils' future educational progress, are considered to be biased. From this perspective, teachers tend to have lower expectations regarding working class pupils and ethnic minorities, compared to high SES pupils and ethnic majorities (e.g. Jussim and Harber 2005; Wiggan 2007). Also, regardless of pupils' level of achievement, children from working class parents are more likely to receive a recommendation to enrol in less academic tracks of secondary education, compared to their counterparts with high social backgrounds (e.g. Boone and Van Houtte 2013b; Ditton and Krusken 2006; Duru-Bellat

2015; Glock et al. 2013; Timmermans et al. 2015). Parents' SES and ethnicity presumably affect teacher expectations and track recommendations through teachers' perceptions of pupils' cognitive and non-cognitive attributes, and teachers' perceptions of their relationships with pupils. Boone and Van Houtte (2013b) suggest that teachers' judgements of pupils' non-cognitive attributes are particularly important in this regard, since these pupil qualities are unequally distributed across social classes. Following their recommendation for further inquiry into this research area, we are especially interested in understanding how SES and ethnicity as parental background characteristics exert an influence on teacher track recommendations, that is, direct or indirect through teacher perceptions. In contrast to Boone and Van Houtte (2013b), who sought clarification by means of exploratory qualitative research methods, our intention is to study the (mediating) relationships between parents' SES and ethnicity, teacher perceptions and teacher track recommendations on a larger scale through quantitative research methods.

3 Research methodology

3.1 Sample and data collection

The present study opts to generate insights concerning the impact of teacher perceptions on teacher track recommendations that are representative in the context of Flemish urban, high multicultural schools and that can be generalised to other educational contexts. Therefore, a quantitative research design was used, in which we were able to question systematically respondents on a large scale. The data were gathered in May 2016, from a sample of 36 Flemish primary schools. Two cities in Flanders were chosen because of the high level of social and cultural diversity in their schools. The collection of data is part of the project Transbaso (see Acknowledgements).

In total, we gathered data for 1014 sixth-grade pupils (when pupils are aged 12), who were assessed by their primary school teachers (sixth-grade teachers) by means of a written questionnaire. Sixty-six teachers were asked to judge each of their pupils in terms of (1) specific cognitive and non-cognitive attributes, (2) teachers' relationships with pupils and (3) the involvement of pupils' parents in education. In addition, the teachers were asked to indicate (4) their track recommendation regarding each of their pupils at the time. In line with the population data of Flemish primary school teachers (Flemish Department of Education and Training 2016), 71.2% of the teachers were women and 28.8% were men. The average age was 37.5 years ($SD=9.46$) (with a minimum and maximum of 23 and 60 years) and the teachers had an average of 14 years of teaching experience ($SD=9.12$) (with a minimum and maximum of .5 and 37 years). At the same time, a written questionnaire was completed by a total of 1157 sixth-grade pupils, in order to gather information about (5) their parents' SES and ethnicity. Previously, the pupils' parents were informed by means of a consent letter. We used structural equation modelling (SEM) in order to test for the existence and strength of the relationships represented in the conceptual

model. The explanatory analyses were carried out on cases that had a valid value for each of our selected variables, which resulted in data for 1014 pupils.

3.2 Instruments

3.2.1 Teacher track recommendations

All teachers were asked to indicate their track recommendation regarding each of their pupils. They were given the following two answer categories: a non-academically oriented track in terms of the B-stream or in terms of the A-stream with technology or arts—coded as 0—and an academically oriented track in terms of the A-stream with Latin or modern sciences—coded as 1. While 64.3% of the pupils in our sample are recommended an academically oriented track by their teachers, only 35.7% of the pupils are recommended a non-academically oriented track. Teacher track recommendations in terms of the B-stream are not considered as a separate category, since it was recommended to only a very small group of pupils (9%).

3.2.2 Pupils' cognitive attributes

All teachers were asked to judge the following items separately with regard to each of their pupils: “maths skills”, “technical skills” and “language skills”. Teachers could nuance their answers, as they were given five answer categories, measured on a 5-point Likert scale ranging from (1) very weak to (5) very strong. In our sample, pupils' cognitive attributes are judged by the teachers above the scale midpoint. The pupils are generally perceived as performing the best in terms of language skills (mean = 3.64; SD = 1.07), followed by technical skills (mean = 3.61; SD = 0.85) and maths skills (mean = 3.53; SD = 1.16).

3.2.3 Pupils' non-cognitive attributes

All teachers were asked to judge the following items with regard to each of their pupils: “ability to plan”, “motivation to learn”, “follows teachers' directions”, “independent”, “alert”, “mature”, “honest”, “friendly” and “considerate of others”. Again, for the first four items, the teachers' answers were measured on a 5-point Likert scale ranging from (1) very weak to (5) very strong. For the remaining items, the teachers' answers were measured on a 5-point Likert scale ranging from (1) totally disagree to (5) totally agree. Also the non-cognitive attributes of the pupils in the present study are judged by the teachers above the scale midpoint, with a higher average score for their personal-social behaviours (mean = 3.96; SD = 0.82) compared to their school-appropriate behaviours (mean = 3.69; SD = 0.84). Since the items are partly based on the existing scales of the Teachable Pupil Survey (Kornblau 1982) and we wished to understand the structure of the items, they were subjected to principal component analysis (PCA). Prior to performing PCA, the suitability of the data was assessed. The Kaiser–Meyer–Olkin measure verifies the sampling adequacy for the analysis, $KMO = .89$, exceeding the recommended value of .6 (Hutcheson and

Sofroniou 1999). PCA with oblique rotation (direct oblimin) reveals the presence of two factors with eigenvalues exceeding 1. The two-factor solution explains 69.35% of the variance. Table 1 shows the factor loadings after rotation. The interpretation of the two factors is consistent with previous research on the Teachable Pupil Survey (Kornblau 1982), with school-appropriate behaviours loading strongly on Component 1 and personal-social behaviours loading strongly on Component 2. The results of this analysis support the use of the school-appropriate behaviour items and the personal-social behaviour items as separate scales. Both scales have good internal consistency, with a Cronbach alpha coefficient of .89 for the School-Appropriate Behaviours Scale and a Cronbach alpha coefficient of .85 for the Personal-Social Behaviours Scale.

3.2.4 Teachers' relationships with pupils

All teachers were asked to judge the following item with regard to each of their pupils: "I have a good relationship with the pupil". Teachers could nuance their answers, as they were given five answer categories, measured on a 5-point Likert scale ranging from (1) totally disagree to (5) totally agree. In our sample, the quality of teachers' relationships with their pupils is assessed above the scale midpoint (mean = 3.93; SD = 0.85).

3.2.5 Parental involvement in education

All teachers were asked to judge the following item with regard to each of their pupils: "involvement of parents". Teachers could nuance their answers, as they were given five answer categories, measured on a 5-point Likert scale ranging from (1) very weak to (5) very strong. In our sample, the involvement of pupils' parents in education is assessed above the scale midpoint (mean = 3.62; SD = 1.22).

Table 1 Summary of PCA with oblimin rotation of two factor solution

Items	Rotated factor loadings	
	School-appropriate behaviours	Personal-social behaviours scale
Ability to plan	.785	.108
Independent	.888	-.123
Alert	.802	.031
Motivation to learn	.656	.274
Follows teacher's directions	.552	.414
Mature	.774	-.095
Honest	.046	.855
Friendly	-.054	.887
Considerate of others	.030	.843

Major loadings for each item are in bold type

3.2.6 Parents' social backgrounds

Parents' SES is based on their professional occupation at the time of the survey or, in cases where they were unemployed, what their previous occupation was. These parental occupations were recoded according to the International Socioeconomic Index of Occupational Status (ISEI) (Ganzeboom et al. 1992). Both the impact of the required educational level associated with parents' occupations and the income level that accompanies parents' occupations are taken into account by this measure, in which occupation can be seen as an intervening activity that converts education into income. To obtain the measurement for family SES, the highest score out of the two parents is used. In our sample, the mean SES score is 49.73 (SD = 22.83). Looking at the range of the scores (with a minimum and maximum of 11.74 and 88.96), both working class and middle class pupils and parents as well as higher class pupils and parents are included.

3.2.7 Parents' cultural backgrounds

Parents' ethnicity is based on the birthplace of the pupil's maternal grandmother, which is commonly used in Flemish and Dutch research (e.g. Jacobs et al. 2009; Timmermans et al. 2002). If the pupil's maternal grandmother was born in Belgium or another North-Western European country, the pupil was given value 0; if she was not, the pupil was given value 1. Our sample consists of 58.4% pupils with parents of Belgian or North-Western European origin and 41.6% of pupils with parents of another origin (mainly from Eastern Europe, Maghreb and Turkey).

4 Results

Using structural equation modelling, we looked at whether or not the hypothesised relationships between teacher perceptions, parents' social and cultural backgrounds and teacher track recommendations fit the empirical data (Muthén and Muthén 1998–2015). We opted for a path analysis due to its ability to test models overall rather than individual coefficients and because it allows to account for the possible impact of the hierarchic structure in our data (model = complex, with "teacher" as the cluster variable). The analysis was conducted using the software package Mplus version 8. The level of analysis was the individual pupil. When testing the model, we used a probit estimator, more specifically the weighted least squares parameter (WLSMV) estimator. We further used the root mean square error of approximation (RMSEA) and the comparative fit index (CFI) as fit indices (Tabachnick and Fidell 2014). RMSEA provides an indication of the model fit with the real situation in the population, should that be known. A value of less than .05 indicates a good fit, while values between .08 and .10 are acceptable (Browne and Cudeck 1993; Hu and Bentler 1999). CFI compares the assumed model with a model without assumed relationships. It has an upper bound of 1 and any value greater than .95 is considered to be an adequate level of model fit (Hu and Bentler 1999). The model was refined based on modification indices.

The final path model with standardised parameter estimates and levels of significance is presented in Fig. 2. The correlations which our analyses revealed not to be statistically significant are not included in the final path model. More detailed information about the model results is included in Table 2, summarising (1) the standardised regression coefficients, (2) standard errors and (3) *P* values indicating the levels of significance. For reasons of completeness, in addition, (4) the unstandardised regression coefficients are included. The fit indices indicate that the model is a good fit (RMSEA: .05; pclose: .47; CFI: .98).

Our first research goal was to identify the impact of teachers' perceptions of pupils' cognitive and non-cognitive attributes and of teachers' perceptions of their relationships with pupils on teacher track recommendations. The path model demonstrates that perceived pupils' cognitive attributes each have a direct, statistically significant effect on teacher track recommendations, after controlling for the other predictors. Teachers' judgements of pupils' maths skills are the most important predictor (parameter estimate .39). Using the Z table, in which we can find the probability that a statistic is observed below, above, or between values on the standard normal distribution (Moore and McCabe 2009), the value .39 corresponds to a probability of .6517. This means that a one-unit increase in perceived maths skills of pupils increases the likelihood of an academically oriented track recommendation of the teacher by 65.17%. The perceived language skills and technical skills of pupils have a small to medium direct effect (.19 and $-.16$, respectively) (analogous to Cohen's (1988) distinctions between "small", "medium" and "large" effects). A one-unit increase in perceived language skills of pupils increases the chance of an academically oriented track recommendation by 57.53%. Moreover, in contrast, the effect of perceived technical skills is negative, indicating that a one-unit increase in perceived technical skills of pupils decreases the chance of an academically

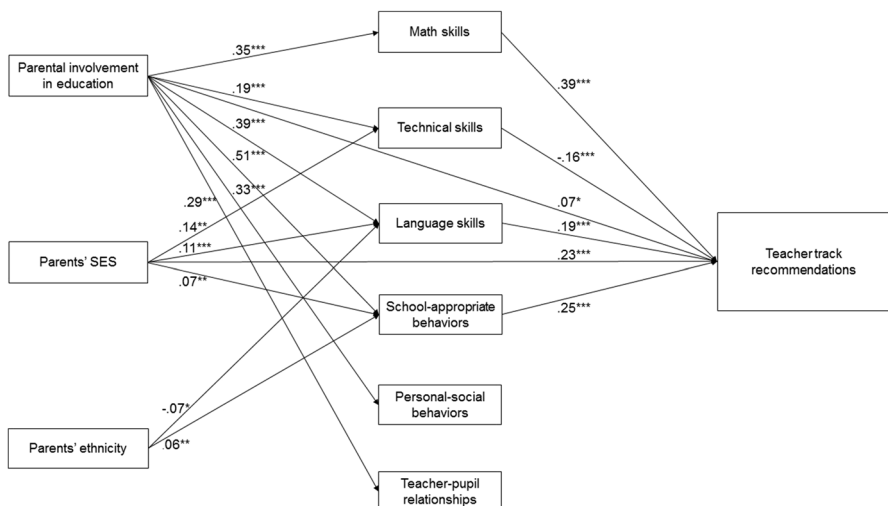


Fig. 2 Path model with standardised parameter estimates and levels of significance. Note: *significant at $p < .10$ level; **significant at $p < .05$ level; ***significant at $p < .001$ level

Table 2 Detailed model results of path analysis

Regression paths	Standardised coefficient	Standard error	<i>P</i> value	Unstandardised coefficient
Teacher track recommendations ON				
Maths skills	.39	.040	.000	.41
School-appropriate behaviours	.25	.038	.000	.35
Parents' SES	.23	.044	.000	.01
Language skills	.19	.041	.000	.21
Technical skills	-.16	.043	.000	-.22
Parental involvement in education	.07	.041	.076	.07
Maths skills ON				
Parental involvement in education	.35	.033	.000	.32
Language skills ON				
Parental involvement in education	.39	.031	.000	.34
Parents' SES	.11	.032	.000	.01
Parents' ethnicity	-.07	.041	.080	-.15
Technical skills ON				
Parental involvement in education	.19	.034	.000	.13
Parents' SES	.14	.043	.002	.01
School-appropriate behaviours ON				
Parental involvement in education	.51	.029	.000	.35
Parents' SES	.07	.034	.048	.00
Parents' ethnicity	.06	.029	.039	.10
Personal-social behaviours ON				
Parental involvement in education	.33	.027	.000	.22
Teacher-pupil relationships ON				
Parental involvement in education	.29	.038	.000	.20

oriented track recommendation of the teacher by 43.64%. Secondly, looking at perceived pupils' non-cognitive attributes, we found that only pupils' perceived school-appropriate behaviours moderately and directly affect the variance in teacher track recommendations (.25). The likelihood of an academically oriented track recommendation increases by 59.87% in cases of a one-unit increase in pupils' perceived school-appropriate behaviours. In contrast, there appears to be no direct, statistically significant effect of perceived pupils' personal-social behaviours on teacher track recommendations after controlling for the other variables in the model. Finally, the same holds for the perceptions held by teachers about their relationships with pupils.

Our second research question examined the possible impact of teachers' perceptions of parental involvement in education and parents' social (i.e. SES) and cultural (i.e. ethnicity) backgrounds on teacher track recommendations. Our first finding is that both teachers' perceptions of parental involvement in education and parents' SES have a direct, statistically significant effect on teacher track recommendations (.07 and .23, respectively). While the effect of parents' SES is small to moderate,

the corresponding regression coefficient of teachers' perceptions of parental involvement in education reveals that this effect is limited. However, in both cases, the higher the perceived involvement of parents in education by teachers and the higher parents' SES, the more likely it is for pupils to be given an academically oriented track recommendation. A one-unit increase in perceived parental involvement in education and in parents' SES increases the chances of an academically oriented track recommendation by 52.79 and 59.10%, respectively. Our second finding is that the variance in teacher track recommendations is not directly, statistically significantly predicted by parents' ethnicity.

Additionally, in line with the second part of Research Question 2, the path model shows some indirect or mediated effects with respect to teachers' perceptions of parental involvement in education and parents' background characteristics, which are all limited to small. Alongside the direct, positive effect of perceived parental involvement in education on teacher track recommendations (.07), this effect is also partly mediated by pupils' perceived maths skills ($.35 \times .39 = .14$), school-appropriate behaviours ($.51 \times .25 = .13$), language skills ($.39 \times .19 = .07$) and technical skills ($.19 \times -.16 = -.03$). Next, teacher track recommendations are directly and positively affected by parents' SES (.23), but also indirectly through perceived language skills ($.11 \times .19 = .02$), school-appropriate behaviours ($.07 \times .25 = .02$) and technical skills ($.14 \times -.16 = -.02$) of pupils. Lastly, despite the absence of a direct statistically significant effect of parents' ethnicity on teacher track recommendations, the path model shows a mediation of the effect of parents' ethnicity by pupils' perceived school-appropriate behaviours ($.06 \times .25 = .02$) and language skills ($-.07 \times .19 = -.01$).

5 Conclusion and discussion

Worldwide educational stakeholders agree on the essential role of teacher perceptions for the classroom practices and decision-making processes of teachers (e.g. Ashton 2015; Fang 1996; Fives and Buehl 2012), including the practice of pupils' allocation at transitory moments (e.g. Eurydice 2011; Fulmer et al. 2015; Gorard and Smith 2004). Like other less meritocratic educational systems, this certainly applies to the educational system of Flanders at the time of transition to secondary education, in which the allocation of pupils is loosely organised. As a result, pupils and parents depend heavily on teacher track recommendations, as an expression of their perceptions of pupils' academic abilities and potential (e.g. Boone and Van Houtte 2013a, b; Penninckx et al. 2011). By means of structural equation modelling (path analysis), the present study investigated the perceptions held by teachers that impact upon teacher track recommendations regarding pupils' enrolment in secondary education.

Our first and main conclusion is that, generally speaking, perceptions held by teachers are clearly crucial for teacher track recommendations, both in a direct and indirect manner. In an attempt to reduce the effects of confounding variables by controlling for other predictors, all the statistically significant effects we found are small to medium. The variables that directly predict teacher track recommendations are

(in decreasing order): teachers' perceptions of maths skills, teachers' perceptions of school-appropriate behaviours (i.e. ability to plan, independence, alertness, motivation to learn, the extent to which pupils follow teachers' directions and maturity), parents' SES, teachers' perceptions of language skills, teachers' perceptions of technical skills and teachers' perceptions of parental involvement in education. Consistent with Fulmer et al. (2015) and their multilevel-model of contextual factors of teachers' assessment practices, these results indicate that predominantly perceptions regarding individual factors of pupils (at the micro-level) impact upon teacher track recommendations. Pupils' perceived cognitive attributes, more specifically maths skills, are the most important predictor. However, we were not able to confirm our hypotheses concerning the impact of teachers' perceptions of pupils' personal-social behaviours and of teachers' perceptions of their relationships with pupils on teacher track recommendations. This means that perceptions held by teachers about pupils' personal-social behaviours, such as the extent to which pupils are considerate of others, and about teachers' relationships with pupils appear not to influence the track recommendations of teachers. It is not immediately clear why, but it is striking that both variables refer to social aspects, to the extent to which teachers and pupils interact with each other and to the extent to which teachers may or may not like their pupils. Future research, perhaps qualitative research, that enables study of these social factors and their possible impact in-depth, may provide more insight.

The direction of the significant effects is in line with what we would expect. The higher pupils' perceived maths skills, school-appropriate behaviours and language skills, the more likely for pupils to be recommended an academically oriented track. The same is true for perceived parental involvement in education and parents' SES. On the other hand, the opposite is true for pupils' perceived technical skills, of which the likelihood of an academically oriented track decreases as perceived technical skills increase. In line with the hierarchical, tracked nature of the Flemish educational system, "strong" pupils generally achieving well at school are expected to enrol in more academically oriented tracks (i.e. Latin and modern sciences), while for pupils with high perceived technical skills less academically oriented tracks, such as technology, are considered to be more appropriate (Department of Education and Training 2008). In tracked educational systems, pupils' early study choices in secondary education have major implications for their educational outcomes, future educational pathways and occupational opportunities (e.g. Belfi et al. 2012; Ireson and Hallam 2001; Levin 2009; Van Houtte 2004). Our findings, however, reveal that tracking is, as it were, already initiated in primary education, more specifically in terms of what is happening within primary school teachers' minds or thought processes. The "stronger" the pupils are perceived by their teachers, the more likely that they will receive an academically oriented track recommendation. Considering the consequences of educational differentiation, it is very important for (student) teachers to become more aware of their own perceptions, how and why they arise and the impact of these perceptions on the way teachers allocate pupils to secondary education and the way they decide upon their track recommendations. Important opportunities for future research can be found in these policy-related implications.

The present study further reveals that teacher track recommendations are indirectly affected as well. In agreement with, amongst others, Boone and Van Houtte

(2013b), alongside a clear direct effect of parents' SES on teacher track recommendations, the present study also demonstrates an indirect impact of parents' SES. As such, our results confirm the socially biased nature of teacher track recommendations (e.g. Boone and Van Houtte 2013b; Ditton and Krusken 2006; Duru-Bellat 2015; Glock et al. 2013; Timmermans et al. 2015). As stated by Ready and Wright (2011), bias can occur in two ways. Whereas general bias refers to teacher track recommendations that are systematically too high or too low for most of the classroom pupils, specific bias refers to teacher track recommendations that are systematically too high or too low for specific (subgroups of) pupils. In this case, the higher the parents' SES, the more likely for pupils to receive an academically oriented track recommendation from their teachers, indicating a systemic bias for pupils who vary in social background. In line with what Farkas (2003) calls non-cognitive traits and behaviours, Boone and Van Houtte (2013b) suggest that this mediation occurs through teachers' specific focus on non-cognitive characteristics of pupils, which we conceptualised and defined as school-appropriate behaviours in this study. However, our results show that cognitive attributes, and more specifically pupils' perceived technical skills and language skills, are equally important in the mediation of the impact of parents' SES on teacher track recommendations. As such, this study is a valuable contribution to the evidence base of the direction and the strength of the relationship between parents' SES and teacher track recommendations. Surprisingly, pupils' perceived maths skills do not seem to play a role in this mediation. It may be that school subjects like language and technology require a greater mastery of the native language than mathematics, which can be considered to be less linguistic. From this perspective, working class pupils and ethnic minorities are possibly more disadvantaged compared to pupils of high social backgrounds and native speakers. Following on from these results, parents' ethnicity impacts upon teacher track recommendations through pupils' perceived language skills and also through pupils' school-appropriate behaviours. Why is it that some parental background characteristics (SES) directly impact upon teacher track recommendations, while others (ethnicity) only indirectly? And why is it that certain teacher perceptions of pupils seem more important in the mediation of the effects of parental background characteristics on teacher track recommendations than others? It goes without saying that each of these unexpected relationships deserves further clarification through future studies.

Lastly, the effect of teachers' perceptions of parental involvement in education on teacher track recommendations is found to be mediated by all the other teacher perceptions included in this study. Moreover, the effects of perceived parental involvement in education on the other teacher perceptions are substantial, in particular the large effect on pupils' perceived school-appropriate behaviours. These results are consistent with the well documented impact of parental involvement in education on pupils' school success, in terms of school achievement and in terms of other psychological processes that support achievement (e.g. Castro et al. 2015; Hoover-Dempsey et al. 2005; Ma et al. 2016). An example of the latter is pupils' motivation to learn, captured in the present study in pupils' school-appropriate behaviours (see Table 1). The large impact of perceived parental involvement in education on pupils' perceived cognitive and non-cognitive attributes and teachers' relationships with pupils, may be due to the fact that all these variables are measured by teachers'

self-report, in contrast to parents' SES and ethnicity as objective measured background characteristics. This way, it seems that, in the minds of teachers, these variables are connected to each other. A positive assessment by teachers on certain levels possibly manifests itself in a global positive assessment and vice versa. Therefore, another relevant issue for further research is the (in)accuracy of teacher perceptions that predict teacher track recommendations, by adding objective measures of pupils' academic functioning in the interplay between teacher perceptions and teacher track recommendations. Although, for instance, Jussim (2017), Jussim and Harber (2005) and Südkamp et al. (2012) argue that teachers' expectations of pupils are fairly accurate, a lot of controversy on this topic exists, hence it still remains unclear (e.g. Holder and Kessels 2017; Ready and Wright 2011; Tenenbaum and Ruck 2007).

Another issue for further research is the extent to which our results may be generalised, which is directly related to the limitation of the particular context in which this study is conducted. The present study intended to investigate the influencing teacher perceptions of teacher track recommendations at the transition to secondary education in Flanders. In other words, our findings are particular to the Flemish context as well as to levels of primary education. Therefore, the results of the present study need validation in other educational contexts and/or during other important transitory moments that determine pupils' educational pathways and future opportunities. Because research on the influence of teacher perceptions in the context of allocation is scarce, we believe that our results may serve as a valuable starting point for future research in other contexts.

Revisiting the research questions of this study, we can conclude that perceptions held by teachers about pupils' maths skills as a cognitive attribute are the most important predictor of teacher track recommendations. However, also pupils' perceived school-appropriate behaviours as a non-cognitive attribute and parents' SES substantially predict teacher track recommendations. Besides these direct effects, teacher track recommendations are also indirectly affected by perceived parental involvement in education, parents' SES and parents' ethnicity.

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Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflict of interest.

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