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# Teacher Perceptions of Learning Motivation and Classroom Behavior: The Role of Student Characteristics

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Authors' Note

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**Abstract**

The present study investigates whether teacher perceptions of students' cognitive skills, their learning motivation, and their classroom behavior differ according to students' socioeconomic status, immigrant background, and gender. Data from N = 4746 German fourth graders and data from their parents and teachers were analyzed using structural equation modeling. Controlling for student achievement as measured in a standardized achievement test and student motivation as measured by student and parent reports, we found that teachers overestimated the cognitive skills of high-SES students and girls in comparison to those of low-SES students and boys. Similarly, teachers perceived high-SES students, students who are not from an immigrant background, and girls as having a higher learning motivation and as having more cognitive skills. Finally, we found that teachers' perceptions of students' learning motivation and classroom behavior mediated the relationship between student characteristics and cognitive skills as perceived by the teacher.

**Keywords**

teacher perceptions, teacher expectations, motivation, inequality

# Teacher Perceptions of Student Motivation and Classroom Behavior: The Role of Student Characteristics

How teachers perceive their students may have a substantial influence on these students' future educational outcomes and trajectories (Hamre & Pianta, 2001, 2005). Do teachers view their students as young people who need to be fostered and motivated or as troublemakers who need to be contained and controlled? Teachers' perceptions of students could influence how often they give encouragement or what grades they award their students. When a teacher holds a student in high regard and, for example, promotes and supports that student frequently, the student might in turn be more motivated and eager to learn in class.

The first study that was systematically concerned with teacher perceptions and their effects in the classroom was *Pygmalion in the Classroom* by Rosenthal and Jacobson (1968). They showed that students performed better when teachers had higher expectations of them. This launched a decades-long controversy about the effects of teacher perceptions and expectations and was followed by numerous studies concluding that teacher perceptions and expectations influence students' academic achievement (for a review, see Jussim & Harber, 2005). While Rosenthal and Jacobson (1968) focused on the effects of teacher expectations on student achievement, others have asked how teacher perceptions and expectations are formed. More specifically, one line of research has looked at the degree to which teacher perceptions differ according to student characteristics such as socioeconomic status (SES), immigration background, or gender; these differences persist even when actual differences in achievement are controlled for (for a meta-analysis, see Dusek & Joseph, 1983). Such studies have found that a link between teacher perceptions and these student characteristics does indeed exist, a conclusion that calls into question whether students receive equal treatment (Jussim, Eccles, & Madon, 1996).

Previous research on teacher perceptions has mostly focused on teacher perceptions or expectations regarding students' achievement (e.g., Gentrup, Rjosk, Stanat, & Lorenz,

2018; Murdock-Perriera & Sedlacek, 2018; Ready & Wright, 2011). In the present study, we argue that this may not entirely capture the picture that teachers have of their students. In addition to focusing on their academic skills, teachers may also consider how motivated students are and how they behave in class when making judgements about students' performance. In particular, in grading situations in which it is not possible to simply count the number of correct answers (i.e., essays, oral presentations), a student's interest in class, compliance with classroom rules, or willingness to invest effort in doing homework may influence the teacher's perceptions of that student. This may, in turn, affect daily student-teacher interactions and may even influence teachers' perceptions of a student's achievement. However, research on teachers' perceptions of students' motivation or classroom behavior is scarce (e.g., Hecht & Greenfield, 2002; Timmermans, Boer, & van der Werf, 2016).

In the present contribution, we wish to extend the research on teacher perceptions by investigating the relationship between student characteristics and teacher perceptions of their learning motivation and classroom behavior. As far as student characteristics are concerned, we focused on students' SES, immigrant background, and gender, because these have been found to be related to teacher perceptions (Auwarter & Aruguete, 2008; Dusek & Joseph, 1983; Lorenz, Gentrup, Kristen, Stanat, & Kogan, 2016). In order to replicate prior research, we first investigated whether these student characteristics were associated with teacher perceptions of students' cognitive skills. We then focused on the link between student characteristics and teachers' perception of students' learning motivation and classroom behavior. In a final step, we examined whether these teacher perceptions of learning motivation and classroom behavior mediated the relation between student characteristics and teacher perceptions of students' cognitive skills.

## Teacher Perceptions, Teacher Expectations, and Accuracy of Teacher Judgements

Teachers who spend several hours a week with their students will soon get an idea of who their students are. They will make assumptions about which students will likely perform

well and which ones will probably try to disturb the class. There are many studies concerned with such teacher perceptions or expectations. However, they have not always differentiated clearly between the two terms (for an exception, see Ready & Chu, 2015). Some have used the term *teacher perceptions* (e.g., Ready & Chu, 2015; Ready & Wright, 2011; Robinson-Cimpian, Lubienski, Ganley, & Copur-Gencturk, 2014), while others have referred to *teacher expectations* (e.g., Rubie-Davies, Peterson, Sibley, & Rosenthal, 2015; Tenebaum & Ruck, 2007) or have used the terms more or less interchangeably (e.g., Blanchard & Muller, 2015; Ferguson, 2003; Hughes, Gleason, & Zhang, 2005; Jussim et al., 1996; Jussim & Harber, 2005; Rubie-Davies, 2010). In this study, we understand the difference between *perceptions* and *expectations* as temporal in character. While *perceptions* refer to the current status quo, *expectations* refer to an anticipated future development. Therefore, in the remainder of this paper, we will use the term *perceptions* to describe situations where teachers judge the current status quo or where the temporal aspect is irrelevant; we will use *expectations* to refer to judgments about the future development of a characteristic.

One of the main topics in the research on teacher perceptions pertains to whether teacher perceptions of student achievement are accurate or if there are factors that may cause discrepancies (Südkamp, Kaiser, & Möller, 2012). To answer such questions, studies usually compare teacher perceptions of student achievement to results in standardized achievement tests. This enables researchers to determine *judgment accuracy* through an "accuracy score." The closer teachers' judgments are to the result of the standardized measure, the better the accuracy (Jussim et al., 1996). The meta-analysis of teacher accuracy by Südkamp et al. (2012) found a correlation between teacher-predicted and actual student achievement of $r$ = .63. The authors concluded that, despite their finding of a positive and fairly high correlation, there was plenty of room for improving judgment accuracy, since there were still other influencing factors. Previous research suggests that student characteristics such as SES, immigrant background, and gender may contribute to inaccuracies in teacher perceptions

(Auwarter & Aruguete, 2008; Boer, Bosker, & van der Werf, 2010; Dusek & Joseph, 1983; Hinnant, O'Brien, & Ghazzarian, 2009; McKown & Weinstein, 2008; Ready & Wright, 2011; Rubie-Davies, Hattie, & Hamilton, 2006). In order to understand why teachers have different perceptions of students despite similar performance, it is necessary to further examine the influence these three student characteristics may have on teacher perceptions.

## Discrepancies in Teacher Perceptions of Student Achievement According to Students' SES, Immigration Background, and Gender

The issue of whether teacher perceptions are influenced by students' SES, immigrant background, and gender has been controversial for some time now (Ferguson, 2003; Jussim & Harber, 2005; Rubie-Davies et al., 2006). A debate has arisen, fueled by previous research that offered conflicting evidence on the question. While some studies indicated systematic discrepancies in teacher perceptions of student achievement for certain groups (Hinnant et al., 2009; Ready & Wright, 2011; Tenebaum & Ruck, 2007), others argued that there are actual differences between these groups in their level of educational achievement and that differences in teacher perceptions thus reflect these differences (Ferguson, 2003; Jussim et al., 1996; Lorenz et al., 2016). Some have even suggested that there are no differences in teacher perceptions at all (Madon et al., 1998; Sorhagen, 2013).

As far as SES is concerned, various studies have addressed this issue. For instance, controlling for prior achievement, ethnicity, and gender, Speybroeck et al. (2012) found that low-SES children's performance was underestimated compared to that of high-SES children as early as kindergarten. Boer et al. (2010) showed in a longitudinal study that teachers tended to have higher expectations of higher SES students and that these differences still influenced student performance after five years, when controlling for student achievement; this confirmed the additive character of teacher expectations across school years already documented by Rubie-Davies et al. (2014). Even though the differences in expectations found

by Boer et al. (2010) declined over a period of two years, they remained stable after this period. An experimental study using case vignettes by Tobisch and Dresel (2017) also found higher achievement expectations for high-SES children than for low-SES children. Ready and Chu (2015) found that, on average, teachers misperceived and underestimated the literacy skills of low-SES children and children whose first language was not English and overestimated those of high-SES children and native English-speaking children; this even applied when controlling for prior achievement. Furthermore, they found that children whose literacy skills had been overestimated, gained more skills in the following years than children who had been judged accurately or who had been underestimated. A longitudinal study by Sorhagen (2013) did not find perception differences for low-SES children in general but found that low-SES students were especially harmed if their skills were underestimated.

Regarding ethnicity and immigrant background, Tenebaum and Ruck (2007) showed in a meta-analysis that included experimental and nonexperimental studies that teachers had lower expectations of African American and Latino students than of White students. They also found that teachers made more positive referrals for white students compared to African American and Latino students. However, they did not control for student achievement or similar measures; this means it is unclear whether the differences between the groups are due to teacher biases or due to differences in student achievement that would justify higher positive referrals and expectations for these groups. A study by Garcia, Sulik, and Obradović (2019) showed that teachers underestimated African American students' executive functions, higher-order problem-solving cognitive skills, and goal-directed behaviors compared to those of white students, even after controlling for these functions. In contrast to the research presented above, a longitudinal study concerned with teacher perceptions of preschoolers' academic abilities did not find an association between teacher perceptions and students' race or ethnicity after controlling for student achievement in reading and math (Baker, Tichovolsky, Kupersmidt, Voegler-Lee, & Arnold, 2015). The evidence from Germany is mixed: One study found teachers overestimated the math abilities or achievement of students

from immigrant backgrounds in general (Hachfeld, Anders, Schroeder, Stanat, & Kunter, 2010), while other studies only found this for children from East European immigrant backgrounds (Lorenz et al., 2016) or did not find any overestimation at all (Westphal et al., 2016). Finally, a further study found that the language competencies of students from a Turkish immigrant background were perceived more negatively than those of their peers when achievement and other characteristics were controlled for (Lorenz et al., 2016). An experimental study using case vignettes found that teachers had lower achievement expectations for students from Turkish immigrant backgrounds both in math and in German (Tobisch & Dresel, 2017).

The effects of gender on teacher perceptions appear to be similarly complex but more domain-specific. Several recent studies found that girls' reading abilities were overestimated compared to those of boys (Hinnant et al., 2009; Meissel, Meyer, Yao, & Rubie-Davies, 2017; Robinson & Lubienski, 2011; Sorhagen, 2013). Muntoni and Retelsdorf (2018) also found that teachers overestimated girls' abilities and that this relation was mediated by the distinctiveness of teachers' stereotypes. Furthermore, according to some studies, and similar to what has been found for SES, there might be actual performance differences that favor girls (McGeown & Johnston, 2009; Mullis, Martin, Kennedy, & Foy, 2007). For instance, in the domain of math, some studies concluded that teachers perceived boys' math achievement more positively, while others suggested that girls were perceived more positively, after controlling for prior math achievement (Robinson-Cimpian et al., 2014; Timmermans, Kuyper, & van der Werf, 2015). A study by McKown and Weinstein (2002) concluded that girls' math abilities were more likely to be underestimated by teachers. Furthermore, they found that this underestimation led to a later confirmation of the teachers' wrongful perceptions—girls' math achievement decreased in the following year. However, they did not find such a pattern for reading. These findings were later confirmed by Gentrup and Rjosk (2018), who found that girls were more likely than boys to confirm negative teacher-

expectancy effects in math but not in reading. More recent research using nationally representative data from the United States confirmed these findings. Teachers perceived girls as having lower mathematical skills than boys after accounting for differences in achievement (Robinson-Cimpian et al., 2014; for a different perspective, see Robinson & Lubienski, 2011). On the other hand, Baker et al. (2015) did not find any association between students' gender and teachers' perceptions of their math and literacy skills after controlling for achievement. A study by Friedrich, Flunger, Nagengast, Jonkmann, and Trautwein (2015) did not find gender differences in teachers' expectations of students' math competences either, but they were able to replicate the findings of the original *Pygmalion* study by Rosenthal and Jacobson (1968); controlling for actual math achievement, they found that the expectations held by teachers in the middle of the year affected students' math achievement at the end of the school year. Additionally, they showed that the expectancy effects were partly mediated by students' self-concept, a finding that was also reported by Szumski and Karwowski (2019). Regarding perceptions of domain-independent constructs such as executive functions, teachers perceived girls as having higher executive functions than boys (Garcia et al., 2019).

Taken together, the research concerned with the influence of student characteristics on teacher perceptions showed that student characteristics seem to influence teacher perceptions of student achievement. However, there is a risk that arises when reducing research on teacher perceptions to perceptions of student achievement: Such research may be short sighted and may not account for the complex processes within the classroom that influence teacher perceptions. Since teachers do not merely perceive their students in performance situations, such as standardized achievement testing, but also in day-to-day class interactions, these factors may be just as important for teachers' judgments as student achievement. Because teachers' judgments in the form of grades do not solely consider student performance but also student effort, it may be worth looking at factors such as students' learning motivation and classroom behavior. Considering the influence student characteristics are thought to have on

perceptions of student achievement, it would be especially interesting if perceptions of students' learning motivation and classroom behavior were subject to similar influences.

## Teacher Perceptions of Students' Learning Motivation and Classroom Behavior

When teachers think about their students, they may not only be thinking about how well they performed in the last test. On the one hand, they may be considering whether they are eager to learn, pay attention in class, are diligent, and show effort, and on the other hand, whether they follow class rules and interact with their peers in an appropriate manner. Studies concerned with the connection between teacher perceptions and student motivation and classroom behavior found a positive connection between students' SES and perceptions of motivation and classroom behavior by teachers (Gentrup et al., 2018; Jussim et al., 1996; Tobisch & Dresel, 2017). Using the same dataset as the present study, Author et al. (2016) found a positive correlation between SES and teacher-perceived student motivation and classroom behavior. However, they only used teacher perceptions as control variables and not as outcomes.

When it comes to the relation between immigrant background and perceptions of students' motivation or classroom behavior, the research is extremely limited. A study from Germany found that students from Eastern Europe were perceived as more motivated than those who did not come from an immigrant background (Lorenz et al., 2016). An experimental study using case vignettes found that teachers perceived students with a Turkish immigrant background as being less willing to put in effort (Tobisch & Dresel, 2017). Studying racial background, a field study by Jussim et al. (1996) did not find differences in teacher perceptions of students' motivation between White and African American students. However, African American students were substantially underrepresented in their sample. In a laboratory experiment using case vignettes, researchers found that teachers underestimated the motivation of students with African American-sounding names compared to those with

Caucasian-sounding names (Anderson-Clark, Green, & Henley, 2008). However, as pointed out by Ferguson (2003). These results have less to do with stereotypical beliefs on the part of the teachers and more to do with the experimental conditions, which usually do not reflect real life. Participants make their judgments based on their experiences in reality. For instance, in a scenario in which group differences—i.e., motivation differences between Black and White students—exist in real life, even if participants take part in an experiment where this connection has been rendered irrelevant due to laboratory conditions, teacher judgments will probably still reflect real-life differences. Therefore, according to Ferguson (2003), the results of laboratory studies concerned with bias may say less about biased teacher perceptions and more about the existing group differences that are reflected in these judgments.

Regarding gender, it is even harder to distinguish between actual motivation and behavior differences and inaccurate perceptions by teachers, since girls tend to exhibit more positive learning behavior in class (Mullola et al., 2012; Ready, LoGerfo, Burkam, & Lee, 2005). However, their motivation and learning behavior has also shown to be overestimated (Gentrup et al., 2018). Robinson-Cimpian et al. (2014), who investigated gender-related perception differences, called this “good girl” behavior. Girls tend to engage in problematic behavior, such as disturbing the class, less often and exhibit teacher-pleasing behavior more often. Duckworth and Seligman (2006) suggested that girls outperform boys on report cards partly because they are more self-disciplined and are consequently rewarded by teachers for this behavior. They could not find any differences in a standardized achievement test between the genders, and boys even performed better than girls on an IQ test. However, when the students’ grade point average was used as a measure, girls outperformed their male classmates in every course subject. A field study with 518 students confirmed this: Gender differences in reported motivation, effort, and behavior—and not in standardized achievement tests—explained gender differences in assigned grades (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006).

Just as studies of the relation between student characteristics and teacher perceptions of student achievement generated ambiguous results, the few studies on the relation between student characteristics and teacher perceptions of student motivation or behavior have likewise produced ambiguous results. The lack of research in this area, combined with the inconsistent findings, calls for further research in order to address the question of whether teacher perceptions of student motivation and classroom behavior are influenced by students' SES, immigrant background, and gender.

## The Present Study

Previous research has found that teachers perceive their students differently based on SES, immigrant background, and gender (Jussim et al., 1996). To date, the majority of research on the relation between student characteristics and teacher perceptions has mainly focused on perceptions of student achievement. However, teachers may also take into account students' motivation and their behavior in class. Teacher perceptions of students' motivation and classroom behavior may have a similar association with student characteristics to the one that exists for teacher perceptions of student achievement.

In the present study, we first aim to replicate existing research by investigating the association between student characteristics—namely SES, immigrant background, and gender—and teacher perceptions of the students' cognitive skills (Research Question 1). Our second goal is to extend our understanding of teacher perceptions by focusing on teacher perceptions of the students' learning motivation (Research Question 2a) and classroom behavior (Research Question 2b) and how they are associated with student characteristics, i.e., SES, immigrant background, and gender. The third and final goal of our study is to investigate whether potential differences in teacher perceptions of students' cognitive skills due to student characteristics are mediated by differences in perceived learning motivation and classroom behavior (Research Question 3).

Using a large-scale sample of fourth graders, their teachers, and their parents, we asked teachers to rate their students' cognitive skills, learning motivation, and classroom behavior and predicted these teacher perceptions based on the students' characteristics. Because differences in teacher perceptions according to SES, immigrant background, and gender could also reflect actual differences between the groups, we included a number of controls in our models: student achievement and self- and parent-reported learning motivation.

## Method

### Sample

We used the main sample from the [blinded] Study (Author et al., 2010a) consisting of 4768 German fourth-graders in 227 classes. It also included data from 212 teachers as well as parent data for 4465 students. Only one class was surveyed per school, along with the students' teachers and parents. The study was conducted in 13 out of 16 federal states in 2007. We excluded one class because we lacked data provided by either the teacher, the students, or the parents, resulting in a final sample of 4746 students in 226 classes. Boys were slightly in the majority, with a percentage of 50.6% of the sample being male. The average age at the time of testing was almost 11 years ($M$ = 10.97, $SD$ = 0.54). 83.8% of the surveyed teachers were female, with an average age of 53 ($M$ = 53.17, $SD$ = 10.67).

In the sample, on average about 21% of the data was missing per variable. 3063 students, almost 65% of our sample, had missing values on 10% or less of the items we used in our analysis. 980 students had missing values on 10% to 40% of the items and 703 students had missing values on 40% or more of the items used in the analysis. Little's MCAR test showed that missing data did not occur completely at random (see also Author et al., 2010b). Hence, we used missing data imputation to address this issue (Graham, 2009) as

missing data imputation makes use of all available information which maximizes test power, and, most importantly, minimizes the risk of biased results, as underlying assumptions are weaker than using pairwise or listwise deletion (see also Collins, Schafer & Kam, 2001; Rubin, 1987). Except for the one excluded class, there were no individuals for whom data was completely missing; core information, such as demographic data and academic grades, was available from objective school records. This was also the case in 14 classes without information provided by the teachers; in these cases, we used data from schools, students, and parents to impute the missing values. We used multivariate imputation by chained equations (MICE; van Buuren & Groothuis-Oudshoorn, 2011). Using all information available in the dataset, we applied MICE to create five complete data sets with imputed values. We then estimated all subsequent analyses five times and combined the results according to Rubin (1987).

## Measures

**Dependent variables: teacher perceptions.** Teachers were presented with a list of student characteristics and asked to rate their students' with respect to their cognitive skills (nine items; e.g., "academic talent," "reading," "math skills"; $\alpha = .90$), learning motivation (nine items; e.g., "interest in learning," "attention in class," "persistency"; $\alpha = .93$) and classroom behavior (eight items; e.g., "self-control," "empathy," "conflict behavior," $\alpha = .91$). The students were judged on a 6-point Likert scale, ranging from 1 = *does not apply at all* to 6 = *applies completely* and were asked to rate all of the students in their class. Teacher perceptions were modeled as latent factors. Confirmatory factor analysis, with all 26 items included and MLR as an estimation method, confirmed that the three factors were clearly separable and showed a moderate to good model fit (CFI = .93; RMSEA = .05; SRMR = .05; Author et al., 2010c).

**Independent variables: student characteristics.** As key predictors, we used three student characteristics: socio-economic status, immigrant background, and gender. We measured students' socio-economic status (SES) using the International Socio-Economic Index of Occupational Status (ISEI; Ganzeboom, Graaf, & Treiman, 1992), which is based on parents' occupations and ranges from 16 (low SES) to 90 (high SES). When data from both parents were available, we used the highest ISEI (HISEI). Immigrant background was operationalized via a dummy variable coded 0 = both parents born in Germany and 1 = at least one parent not born in Germany. Gender was dummy coded (0 = female, 1 = male).

**Control variables.** To measure student achievement, we used standardized achievement tests for math, science, and German. The tests were part of the TIMSS 2007 assessments (Bos et al., 2008). The math test comprised 179 test items with 96 multiple-choice and 83 short-answer items. The topics covered in the math test's questions mirrored the distribution of these topics in school books, meaning that 52% of the items were arithmetic questions, 34% geometry/measurement questions, and 15% data questions. 39% of the questions required students to reproduce content, 39% required them to apply content, and 22% required them to solve problems. The internal consistency was $\alpha = .83$ (cf. Bonsen, Lintorf, Bos, & Frey, 2008). The science test consisted of 174 items, with 93 multiple-choice and 83 short-answer items. The questions were derived from biology (43%), physics (37%), and chemistry (21%). 44% of the questions required students to reproduce content, 26% required them to apply content, and 20% required them to solve problems. The internal consistency was $\alpha = .80$ (cf. Bonsen et al., 2008). Students' achievement in German was measured using a 446-item test, which captured the topics of reading, listening, language use, and spelling. The multimatrix sampling method allowed each student to work on problems from just two to three topics. Despite the differences between the four topics, it was possible to fit a one-dimensional Rasch model with a composite score; this indicated achievement in

German. The WLE reliability of the test was $r = .81$ (Author et al., 2010b).

We used five items to assess students' learning motivation (e.g., "Sometimes, I am really eager to continue learning," α = .78; CFI = .99; RMSEA = .05; SRMR = .02) and four items regarding willingness to perform in school (e.g., "I find it easy to pay attention in class when I want to learn something," α = .69; CFI = .99; RMSEA = .01; SRMR = .01; cf. Author, 2010). We wanted to have a second source of data on students' learning motivation and their willingness to perform in school to improve the robustness of the analysis and thus included parents' ratings of their children. The items were similar to the items the children answered, but they were not identical. Parents rated their children's learning motivation (three items; e.g., "My child is interested in learning," α = .74) and their child's willingness to perform in school (four items; e.g., "My child can follow class attentively," α = .80; CFI = .93; RMSEA = .16; SRMR = .04). The items answered by the students and their parents ranged from "not true at all" (1) to "very true" (4) (Author et al., 2010c). The descriptive statistics for all variables and the correlations between them are shown in Table 1.

**Table 1**
Descriptive statistics and correlations.

| | Variable | Coefficient | | Min-Max | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Student characteristics* | | | | | | | | | |
| 1. | SES (HISEI) *M* (*SD*) | 51.10 | (16.35) | 16–90 | – | | | | | |
| 2. | Immigrant background *(%)* | 25.0 | | 0–1 | -0.13*** | – | | | | |
| 3. | Girls (%) | 49.5 | | 0–1 | 0.00 | – | – | | | |
| | *Teacher perceptions* | | | | | | | | | |
| 4. | Learning motivation *M* (*SD*) | 4.50 | (0.95) | 1–6 | 0.18*** | -0.06*** | -0.21*** | – | | |
| 5. | Classroom behavior *M* (*SD*) | 4.57 | (0.95) | 1–6 | 0.11*** | -0.05*** | -0.28*** | 0.69*** | – | |
| 6. | Cognitive skills *M* (*SD*) | 4.24 | (0.91) | 1–6 | 0.23*** | -0.09*** | -0.06*** | 0.78*** | 0.50*** | – |
| | *Standardized achievement tests* | | | | | | | | | |
| 7. | Math achievement *M* (*SD*) | 150.69 | (9.56) | 90–195 | 0.23*** | -0.16*** | 0.07*** | 0.35*** | 0.21*** | 0.51*** |
| 8. | Science achievement *M* (*SD*) | 150.58 | (9.48) | 110–180 | 0.22*** | -0.21*** | 0.08*** | 0.26*** | 0.14*** | 0.42*** |
| 9. | German achievement *M* (*SD*) | 150.29 | (9.75) | 110–195 | 0.09*** | -0.08*** | -0.07*** | 0.25*** | 0.15*** | 0.31*** |
| | *Student-reported measures* | | | | | | | | | |
| 10. | Learning motivation *M* (*SD*) | 3.06 | (0.63) | 1–4 | 0.02*** | 0.09*** | -0.21*** | 0.12*** | 0.06*** | 0.12*** |
| 11. | Willingness to perform at school *M* (*SD*) | 3.35 | (0.50) | 1–4 | 0.07*** | 0.00*** | -0.05*** | 0.23*** | 0.13*** | 0.21*** |
| | *Parent-reported measures* | | | | | | | | | |
| 12. | Learning motivation *M* (*SD*) | 3.27 | (0.60) | 1–4 | 0.04** | 0.10*** | -0.16*** | 0.32*** | 0.24*** | 0.27*** |
| 13. | Willingness to perform in school *M* (*SD*) | 2.94 | (0.66) | 1–4 | 0.10*** | 0.06*** | -0.12*** | 0.44*** | 0.31*** | 0.42*** |

*Note.* $N = 4746$. HISEI = Highest ISEI value in family (father or mother); Minimum/ maximum for the standardized achievement tests are empirical values (in contrast to theoretical minimum/ maximum of the other reported scales).
* $p < .05$. ** $p < .01$. *** $p < .001$.

**Statistical Analyses**

We used structural equation modeling in M*plus* (Muthén & Muthén, 2013) to analyze our research question employing MLR as an estimator for all models. To test whether or not there was a connection between student characteristics and teacher perceptions of students' cognitive skills (Research Question 1), learning motivation (Research Question 2a), and classroom behavior (Research Question 2b), we used the students' SES, immigrant background and gender as predictors in the first model. We then added the control variables step by step, which allowed us to look at changes in the prediction values of the characteristics, how the controls may confound these values, and the decrease in residual variance. The estimated full models showed a moderate to good fit (CFI > .93, RMSEA < .06, and SRMR < .06,; Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003). In our final analysis, we examined whether teacher-perceived learning motivation and classroom behavior served as mediators of the association between student characteristics and teacher-perceived cognitive skills (Research Question 3). We computed the indirect effects through the "model indirect" command in M*plus* 7.11 using bootstrapping according to Hayes (2009) with $k = 1000$. The fit indices for the mediation model showed a moderate to good fit (CFI = .90, RMSEA = .04, and SRMR = .08).

Given that students were nested in classrooms in our sample, we had to account for the multilevel structure of the dataset, namely for the intraclass correlation (ICC), which can lead to an underestimation of the standard errors if ignored (Muthén & Satorra, 1995; Raudenbush & Bryk, 2002). Since we only examined processes at the individual level and not at the class or school level, we took the clustered structure into account by using robust standard errors (TYPE = COMPLEX) in M*plus 7.11* (Muthén & Muthén, 2013). Prior to analysis, we *z*-standardized all continuous variables.

# Results

## Research Question 1: The Link between Student Characteristics and Teacher Perceptions of Students' Cognitive Skills

For our first research question, which asked whether student characteristics (SES, immigrant background, and gender) predicted teacher perceptions of students' cognitive skills, results are shown in Table 2. Model 1 revealed that all three student characteristics—SES, immigrant background, and gender—predicted teacher perceptions of students' cognitive skills. In a subsequent step, we added the standardized achievement test scores in math, science, and German to the model (Model 2), each of which were substantial predictors of teacher perceptions. As a result, the size of the link between the perceived cognitive skills and SES was halved and the link between perceived cognitive skills and immigrant background disappeared entirely. Finally, we added further controls step by step. We added learning motivation and willingness to perform in school, first, as reported by the students themselves and, second, as reported by parents. The full model (Model 6) showed that SES and gender remained significant predictors of teacher perceptions of students' cognitive skills but immigrant background was no longer significant. Students with a higher SES and girls were perceived to have higher cognitive skills than students with a lower SES and boys.

**Table 2**
Predicting teacher perceptions of students' cognitive skills.

| Variable | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* |
| SES (HISEI) | 0.25*** | 0.02 | 0.12*** | 0.02 | 0.12*** | 0.02 | 0.11*** | 0.02 | 0.11*** | 0.02 | 0.10*** | 0.02 |
| Immigration background | −0.17*** | 0.04 | 0.05 | 0.04 | 0.02 | 0.04 | 0.03 | 0.04 | −0.02 | 0.04 | −0.05 | 0.04 |
| Gender | −0.12*** | 0.03 | −0.19*** | 0.03 | −0.18*** | 0.03 | −0.17*** | 0.03 | −0.10*** | 0.03 | −0.07** | 0.03 |
| Math achievement | | | 0.37*** | 0.02 | 0.37*** | 0.02 | 0.35*** | 0.02 | 0.33*** | 0.02 | 0.27*** | 0.02 |
| Science achievement | | | 0.19*** | 0.02 | 0.18*** | 0.02 | 0.18*** | 0.02 | 0.18*** | 0.02 | 0.16*** | 0.02 |
| German achievement | | | 0.11*** | 0.02 | 0.11*** | 0.02 | 0.11*** | 0.02 | 0.10*** | 0.02 | 0.08*** | 0.02 |
| *Student-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | 0.11*** | 0.02 | 0.01 | 0.02 | −0.03 | 0.02 | −0.00 | 0.03 |
| Willingness to perform in school | | | | | | | 0.17*** | 0.03 | 0.14*** | 0.03 | 0.10** | 0.03 |
| *Parent-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | | | | | 0.19*** | 0.02 | 0.00 | 0.03 |
| Willingness to perform in school | | | | | | | | | | | 0.32*** | 0.03 |
| $R^2$ | 0.07 | | 0.35 | | 0.36 | | 0.38 | | 0.41 | | 0.46 | |

*Note.* $N$ = 4746. HISEI = Highest ISEI value in family (father or mother); Gender was dummy coded (0 = female, 1 = male); Immigrant background was dummy coded (0 = no immigrant background, 1 = immigrant background); Regression coefficients of continuous predictors are standardized.
* $p < .05$. ** $p < .01$. *** $p < .001$.

**Research Questions 2a and 2b: Student Characteristics and Teacher Perceptions of Students' Learning Motivation and Classroom Behavior**

We proceeded in the same way to answer the question of whether there was a relation between student characteristics and teacher perceptions of the students' learning motivation (Research Question 2a) and classroom behavior (Research Question 2b). The results for learning motivation (Research Question 2a) are shown in Table 3. All three student characteristics were significant predictors of teacher-perceived learning motivation in the first model; yet, once again, immigrant background lost its predictive power when student achievement was added into the model (Model 2) and the predictive power of SES was halved. We then proceeded as described above for our first research question and added further controls into the model step by step (Models 3–5). The full model (Model 6) showed that all three student characteristics—including immigrant background—served as statistically significant predictors of perceived learning motivation. Girls had a perceived learning motivation that was 0.31 of a standard deviation higher than that of boys with a similar achievement, learning motivation, and willingness to perform. Furthermore, students' SES yielded an effect of $b = 0.08$ and immigrant background of $b = -0.10$ on teacher perceptions of students' learning motivation. These results highlight the importance of the differences in scale when comparing the relations between the different student characteristics and teacher perceptions: SES was operationalized through a continuous measure, while immigrant background and gender were dummy coded. While it might appear at first sight that the relationships between perceived learning motivation and SES and immigrant background, respectively, are almost equal in size, it is important to note that the first relationship represents the differences in standard deviation and the second between students with and without immigrant background.

**Table 3**
Predicting teacher perceptions of students' learning motivation.

| Variables | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* |
| SES (HISEI) | 0.19*** | 0.02 | 0.10*** | 0.02 | 0.10*** | 0.02 | 0.09*** | 0.02 | 0.09*** | 0.01 | 0.08*** | 0.01 |
| Immigration background | −0.11* | 0.04 | 0.03 | 0.04 | −0.01*** | 0.04 | 0.01 | 0.04 | −0.06 | 0.04 | −0.10* | 0.04 |
| Gender | −0.42*** | 0.03 | −0.46*** | 0.03 | −0.45*** | 0.03 | −0.43*** | 0.03 | −0.34*** | 0.03 | −0.31*** | 0.03 |
| Math achievement | | | 0.28*** | 0.02 | 0.28*** | 0.02 | 0.26*** | 0.02 | 0.23*** | 0.02 | 0.17*** | 0.02 |
| Science achievement | | | 0.09*** | 0.02 | 0.09*** | 0.02 | 0.08*** | 0.02 | 0.08*** | 0.02 | 0.06*** | 0.02 |
| German achievement | | | 0.10*** | 0.02 | 0.10*** | 0.02 | 0.09*** | 0.02 | 0.09*** | 0.02 | 0.07*** | 0.02 |
| *Student-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | 0.13*** | 0.02 | 0.02 | 0.03 | −0.04 | 0.03 | −0.01 | 0.03 |
| Willingness to perform in school | | | | | | | 0.20*** | 0.03 | 0.17*** | 0.03 | 0.11*** | 0.03 |
| *Parent-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | | | | | 0.25*** | 0.02 | 0.05 | 0.03 |
| Willingness to perform in school | | | | | | | | | | | 0.35*** | 0.03 |
| $R^2$ | 0.08 | | 0.22 | | 0.24 | | 0.26 | | 0.31 | | 0.38 | |

*Note*. $N$ = 4746. HISEI = Highest ISEI value in family (father or mother); Gender was dummy coded (0 = female, 1 = male); Immigrant background was dummy coded (0 = no immigrant background, 1 = immigrant background); Regression coefficients of continuous predictors are standardized.
* $p < .05$. ** $p < .01$. *** $p < .001$.

The results for teacher perceptions of students' classroom behavior (Research Question 2b) are shown in Table 4. We found a similar pattern as before, with all three characteristics being significant predictors in the first model but with immigrant background losing all predictive power and with the predictive power of SES being almost halved after controlling for achievement in Model 2. After we added the controls (Models 3–5), the full model (Model 6) showed a significant link between SES, immigrant background, and teacher perceptions of students' classroom behavior; this particularly favored children with higher SES and those without an immigrant background in comparison to children with lower-SES and immigrant children. Girls' classroom behavior was perceived more positively in the amount of 0.50 of a standard deviation higher than that of boys with similar achievement, learning motivation, and willingness to perform. Furthermore, teacher perceptions of students without an immigrant background were 0.13 of a standard deviation higher than teacher perceptions of the classroom behavior of their counterparts from immigrant backgrounds. The classroom behavior of higher-SES students was also more positively perceived ($b$ = 0.05).

**Table 4**
Predicting teacher perceptions of students' classroom behavior.

| Variables | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* | *b* | *SE* |
| SES (HISEI) | 0.11*** | 0.02 | 0.06** | 0.02 | 0.06** | 0.02 | 0.06** | 0.02 | 0.06** | 0.02 | 0.05** | 0.02 |
| Immigration background | −0.12** | 0.04 | 0.04 | 0.04 | −0.05 | 0.04 | −0.06 | 0.04 | −0.10* | 0.04 | −0.13** | 0.04 |
| Gender | −0.57*** | 0.03 | −0.60*** | 0.03 | −0.60*** | 0.03 | −0.59*** | 0.03 | −0.52*** | 0.03 | −0.50*** | 0.03 |
| Math achievement | | | 0.18*** | 0.02 | 0.18*** | 0.02 | 0.17*** | 0.02 | 0.15*** | 0.02 | 0.10*** | 0.02 |
| Science achievement | | | 0.04 | 0.02 | 0.04*** | 0.02 | 0.03 | 0.02 | 0.04 | 0.02 | 0.01 | 0.02 |
| German achievement | | | 0.05** | 0.02 | 0.05** | 0.02 | 0.05* | 0.02 | 0.04* | 0.02 | 0.03 | 0.02 |
| *Student-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | 0.07*** | 0.02 | 0.01 | 0.03 | −0.04 | 0.03 | −0.01 | 0.03 |
| Willingness to perform in school | | | | | | | 0.10** | 0.03 | 0.07* | 0.03 | 0.03 | 0.03 |
| *Parent-reported measures* | | | | | | | | | | | | |
| Learning motivation | | | | | | | | | 0.20*** | 0.02 | 0.03 | 0.04 |
| Willingness to perform in school | | | | | | | | | | | 0.27*** | 0.03 |
| $R^2$ | 0.10 | | 0.15 | | 0.15 | | 0.16 | | 0.19 | | 0.22 | |

*Note.* $N$ = 4746. HISEI = Highest ISEI value in family (father or mother); Gender was dummy coded (0 = female, 1 = male); Immigrant background was dummy coded (0 = no immigrant background, 1 = immigrant background); Regression coefficients of continuous predictors are standardized.
* $p < .05$. ** $p < .01$. *** $p < .001$.

## Research Question 3: Mediation by Teacher Perceptions of Students' Learning Motivation and Classroom Behavior

In our final analysis, we tested whether the effects of student SES, immigrant background, and gender on teacher perceptions of students' cognitive skills were mediated by teachers' perceived learning motivation and classroom behavior. The results of this model can be seen in Table 5. We also estimated both total indirect and specific indirect effects. We found a total indirect effect for each of the three student characteristics: The total indirect effect of SES on perceived cognitive skills via teacher perceptions of learning motivation and classroom behavior was $b$ = 0.06 ($p < .001$), the total indirect effect of immigrant background was $b$ = -0.07 ($p < .05$) and the total indirect effect of gender was $b$ = -0.20 ($p < .001$).

Comparing the specific indirect effects of perceived learning motivation with perceived classroom behavior on perceived cognitive skills across all three student characteristics, perceived learning motivation turned out to be a more powerful mediator than perceived classroom behavior. With respect to SES and immigrant background, the specific indirect effect of perceived learning motivation on perceived cognitive skills was $b$ = 0.06 ($p < .001$) for SES and $b$ = -0.07 ($p < .001$) for immigrant background, while the specific indirect effects of perceived classroom behavior on perceived cognitive skills were not significant.

With respect to gender, the specific indirect effect of perceived motivation on perceived cognitive skills was far greater ($b$ = -0.24, $p$ < .01) than the specific indirect effect of perceived classroom behavior ($b$ = 0.02, $p$ < .05).

**Table 5**
The effects of student characteristics and teacher perceptions of students' learning motivation and classroom behavior on teacher perceptions of students' cognitive skills.

| | Model 7 | | | | | |
|---|---|---|---|---|---|---|
| | Teacher perceptions of students'… | | | | | |
| Variables | learning motivation | | classroom behavior | | cognitive skills | |
| | *b* | *SE* | *b* | *SE* | *b* | *SE* |
| SES (HISEI) | 0.08*** | 0.01 | 0.04** | 0.02 | 0.04** | 0.01 |
| Immigration background | −0.10* | 0.04 | −0.13** | 0.04 | 0.01 | 0.03 |
| Gender | −0.30*** | 0.03 | −0.48*** | 0.03 | 0.13*** | 0.02 |
| Teacher perceptions of students' learning motivation | – | – | – | – | 0.75*** | 0.02 |
| Teacher perceptions of students' classroom behavior | – | – | – | – | −0.05* | 0.02 |
| Math achievement | 0.15** | 0.02 | 0.07** | 0.02 | 0.15*** | 0.02 |
| Science achievement | 0.00 | 0.02 | 0.00 | 0.02 | 0.11*** | 0.01 |
| German achievement | 0.02 | 0.02 | 0.02 | 0.02 | 0.04** | 0.01 |
| *Student-reported measures* | | | | | | |
| Learning motivation | −0.03 | 0.02 | −0.05 | 0.03 | 0.00 | 0.02 |
| Willingness to perform in school | 0.13* | 0.03 | 0.08 | 0.03 | 0.01 | 0.02 |
| *Parent-reported measures* | | | | | | |
| Learning motivation | −0.02 | 0.03 | −0.06 | 0.03 | −0.02 | 0.02 |
| Willingness to perform in school | 0.45*** | 0.04 | 0.40*** | 0.03 | 0.06** | 0.04 |
| $R^2$ | 0.42 | | 0.27 | | 0.80 | |

*Note*. $N$ = 4746. HISEI = Highest ISEI value in family (father or mother); Gender was dummy coded (0 = female, 1 = male); Immigrant background was dummy coded (0 = no immigrant background, 1 = immigrant background); Regression coefficients of continuous predictors are standardized; Estimations are bootstrapped with $k$ = 1000; "Learning motivation, by parents" was specified as a manifest variable in order to assure convergence of the model.
* $p$ < .05. ** $p$ < .01. *** $p$ < .001.

## Discussion

Numerous scholars have discussed possible ways how and if student characteristics shape teacher perceptions of achievement-related measures (Ferguson, 2003; Hinnant et al., 2009; Jussim et al., 1996; Ready & Wright, 2011). However, comparable evidence in regard to learning motivation and classroom behavior has been limited. Because these might be equally important factors for teachers' informal and formal judgments of students, we extended the field of teacher perception research by investigating how student characteristics might be linked to teacher-perceived learning motivation and classroom behavior.

Regarding our first research question, which concerned perceptions of the students' cognitive skills, we were able to replicate findings that low-SES children's and boys' achievement is underestimated in comparison to student achievement as measured in

standardized achievement tests (Muntoni & Retelsdorf, 2018; Ready & Chu, 2015; Speybroeck et al., 2012). However, our results were not entirely comparable to those of other studies, since those studies usually reduced teacher-perceived student achievement to perceptions of achievement in math or reading; by contrast, we applied a more integrated measure in order to capture a broader picture of students' cognitive skills.

With regard to the relation between student characteristics and perceptions of students' learning motivation (Research Question 2a) and classroom behavior (Research Question 2b), our analysis suggested that all three characteristics were linked to teacher perceptions, even after taking into account student achievement and student- and parent-reported learning motivation.

With regard to SES, we found that students with higher SES were perceived as having higher learning motivation and as being better behaved in school than children with lower SES. These results are consistent with results from other studies on the relation between students' SES and teacher perceptions of motivation and behavior (Gentrup et al., 2018; Speybroeck et al., 2012; Westphal et al., 2016); these studies likewise found that motivation and behavior were overestimated for higher-SES students. The effects of SES on perceived learning motivation were almost twice as large as the effects of SES on perceived classroom behavior.

Concerning immigrant background, we found that teacher perceptions favored students who do not have an immigrant background or who are part of the majority. To our knowledge, there are almost no international studies concerned with the effects of immigrant background on teacher perceptions of students' motivation or classroom behavior that are comparable to ours, thus making it difficult to integrate our findings into the existing literature. The only somewhat comparable study which concerned Germany was by Gentrup et al. (2018), who found that motivation and behavior was underestimated for students with Turkish immigrant backgrounds and overestimated for students with Eastern European

immigrant backgrounds.

With regard to gender, our findings are in accordance with most of the literature about gender differences with respect to motivation and classroom behavior; this literature found that girls conformed more to classroom rules (Duckworth & Seligman, 2006; Kenney-Benson et al., 2006; Mullola et al., 2012). With respect to perceived classroom behavior, where factors like achievement only played a minor role, we found a very strong relationship between students' gender and teacher perceptions, even after controlling for students' and parents' reports of students' motivation. Even though these findings could plausibly be interpreted as indicating an overestimation of girls' perceived classroom behavior, the more favorable teacher perceptions of girls may also reflect real existing gender differences. These differences especially relate to what Robinson-Cimpian et al. (2014) called "good girl" behavior, with girls showing higher conformity in the classroom. While we had sufficient controls for students' learning motivation, it is debatable whether our controls for student behavior captured these behaviors. Therefore, our study is limited in its capacity to further differentiate over- or underestimation from such behavioral differences between the groups.

In this respect, our study offers an excellent example of the difficulties that arise when examining teacher perceptions and particularly when evaluating over- or underestimation, which requires researchers to separate actual differences in behavior or other factors from over- or underestimation by the teacher. For example, we tried to account for actual group differences as effectively as possible, but if past behavior is correlated with gender, then the teacher's judgment will be too. Since this may be the case (Ready et al., 2005), we cannot determine with absolute certainty where the actual differences end and the overestimation by the teacher begins. Therefore, whether researchers should speak of "over- or underestimation"—or even more so label it as "bias"—is an open question; arguably, the notion of perception discrepancies could also be used here.

Finally, regarding Research Question 3, we found that teacher-perceived learning

motivation and classroom behavior mediated the relation between the student characteristics and teacher-perceived cognitive skills. For each of the three student characteristics, perceived learning motivation turned out to be a far more important mediator than perceived classroom behavior. While we found a large effect of teacher-perceived learning motivation on perceived cognitive skills, the effect of teacher-perceived classroom behavior was rather small in comparison. Furthermore, teacher-perceived learning motivation was far more predictive than standardized achievement in math, science, and German. Teacher-perceived motivation mediated a large proportion of the relation between student characteristics and teacher-perceived cognitive skills, since the indirect effects were all larger than the direct effects. These results suggest that teachers perceive female students, students with higher SES, and students who do not come from immigrant backgrounds as having a higher learning motivation and therefore higher cognitive skills. While it may not be surprising that teachers perceive more motivated students as having higher cognitive skills, the minor role of perceived classroom behavior is surprising. Especially with respect to gender, we did not find evidence of rewards for "good girl" behavior by teachers as was suggested by Robinson-Cimpian et al. (2014) or Duckworth and Seligman (2006).

## Limitations and Future Research

Our study has several limitations and implications that need to be considered when interpreting our findings. These should be addressed in future research. First, because we did not use an experimental design, we cannot rule out the possible influence of confounding variables and thus cannot make causal claims. Second, our control variables did not capture the exact same aspects as those captured by the items presented to the teachers. While the teachers were asked to rate their students' classroom behavior on items asking about characteristics like "self-control" or "empathy," the students and their parents answered items about students' ability to pay attention or willingness to make an

effort in class. Therefore, our measure of students' willingness to perform may not reflect the same aspects of students' classroom behavior that the teachers had in mind when they rated their students. In a similar vein, it should be further noted that the items we used to measure the students' self-reported learning motivation and willingness to perform were similar but not identical to the items answered by parents regarding students' learning motivation and willingness to perform. It may also have been worthwhile to use more objective measures as control variables, such as an observation of actual student behavior in class. Furthermore, our measures of perceived motivation and behavior may not solely reflect teachers' perceptions of their students' motivation and behavior but could also have been influenced by factors such as teachers' liking for certain students.

Third, we could not investigate the extent to which the differences in teacher perceptions could be explained by biases or stereotypes held by the teachers. If researchers are interested in the presence of bias within teacher judgments, it may be more fruitful to investigate the presence of stereotypes within teacher judgments directly rather than trying to separate actual differences from potential bias. There are already studies concerned with stereotypes among teachers, and they usually find that children with low SES, children from immigrant backgrounds, or boys are subjected to stereotypes (Glock & Krolak-Schwerdt, 2013; Holder & Kessels, 2017; Jussim et al., 1996; Muntoni & Retelsdorf, 2018). Since these are the groups that were also underestimated by teachers in our study, it may be that the underestimation we found indicates the presence of bias or stereotypes within teacher perceptions.

Fourth, due to our sample size, we were not able to investigate whether or not teacher perceptions differed for immigrant students from different countries. Lorenz et al. (2016) found teachers to have negative performance expectations for students with a Turkish immigrant background and positive performance expectations for students with an Eastern European immigrant background when compared to students with no immigrant background.

Similar differences may exist concerning teacher perceptions of motivation and behavior and should be addressed by future research.

Finally, we did not investigate whether the different perceptions of students' learning motivation or classroom behavior were related to teacher judgments in the form of grades or assessments of classroom behavior. Furthermore, it would be interesting to determine whether teachers change their behavior towards students they perceive as very motivated or not motivated at all. On the student side, we did not investigate whether and how the perceptions of student motivation or behavior predicted actual student achievement, student motivation, or student behavior. The original *Pygmalion* study by Rosenthal and Jacobson (1968) found that students confirmed their teachers' incorrect perceptions with respect to achievement, and there may be a similar mechanism at work here with regard to motivation or behavior. If students are perceived as being very motivated, they may be encouraged more often by the teacher and therefore become very motivated or live up to their teachers' expectations. On the other hand, this could also imply that groups whose motivation and behavior are usually underestimated by teachers—such as boys, low-SES students, or students from immigrant backgrounds—may experience more discouraging day-to-day student-teacher interactions than female students, those with higher SES, and those without an immigrant background. For example, they may experience more blame, criticism, and negative feedback, which may reduce their actual motivation and therefore lower their enjoyment and performance in school. But the effect may go further than just affecting these groups' well-being in school. Since, at least in Germany, motivation and behavior are factors that are taken into account when grades are awarded, underestimations of these groups' motivation and behavior may lead to teachers awarding worse grades to male students, those with low-SES or those with immigrant backgrounds and therefore negatively affect their educational trajectories and later life outcomes. This could constitute another path through which at-risk groups are further disadvantaged and threaten equal opportunities in education.

It should be noted that even though we conducted our study in Germany, where factors such as student motivation and behavior play a larger role in teacher judgements of students' performance than in educational systems that ask teachers to leave out factors such as the students' participation or conduct in class when assigning grades, we argue that teacher perceptions of students' motivation and classroom behavior are also likely to be relevant in these systems. Even if the teachers are asked to rate the students' achievement only, there are certain subjects which make it difficult to just count the number of correct answers in an assignment or test (i.e., when grading an essay). It is reasonable to assume that students' motivation and their behavior in class will implicitly influence such judgements by teachers.

Taken together, the present study intended to provide further evidence on how teacher perceptions are related to student characteristics, which we believe is a very important issue in educational practice. We extended the existing research in this area by studying teacher perceptions of student motivation and classroom behavior and showed that such perceptions differ according to students' SES, immigrant background, and gender. Furthermore, through our mediation analysis, we showed that how teachers perceive their students' motivation and classroom behavior is also important for teachers' perceptions of cognitive skills.

# Appendix

**Table A1**
Descriptive statistics before imputation.

| Variables | | *N* | *M* | *SD* |
|---|---|---|---|---|
| | *Student characteristics* | | | |
| 1 | SES (HISEI) | 3450 | 51.03 | 16.36 |
| 2 | Immigrant background | 3894 | 0.25 | 0.43 |
| 3 | Gender | 4766 | 0.50 | 0.50 |
| | *Teacher perceptions of students'* | | | |
| 4 | Learning Motivation | 3712 | 4.50 | 1.07 |
| 5 | Classroom behavior | 3711 | 4.57 | 1.01 |
| 6 | Cognitive skills | 3712 | 4.25 | 1.06 |
| | *Standardized achievement* | | | |
| 7 | Math achievement | 4575 | 150.71 | 9.54 |
| 8 | Science achievement | 4574 | 150.57 | 9.48 |
| 9 | German achievement | 2923 | 150.33 | 9.71 |
| | *Student-reported measures* | | | |
| 10 | Learning motivation | 4007 | 3.02 | 0.60 |
| 11 | Willingness to perform in school | 3971 | 3.35 | 0.52 |
| | *Parent-reported measures* | | | |
| 12 | Learning motivation | 4419 | 3.32 | 0.53 |
| 13 | Willingness to perform in school | 4393 | 2.94 | 0.68 |

*Note.* HISEI = Highest ISEI value in family (father or mother); Gender was dummy coded (0 = female, 1 = male); Immigrant background was dummy coded (0 = no immigrant background, 1 = immigrant background).
* $p < .05$. ** $p < .01$. *** $p < .001$.

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