A two-level study of predictors of private tutoring attendance at the beginning of secondary schooling in Germany: The role of individual learning support in the classroom

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More and more students attend private supplementary tutoring to improve their academic achievement. Private tutoring might be understood as a reaction to insufficient instructional quality in school, especially regarding individual support. However, it might also be possible that parents generally see insufficient grades as an indicator of lacking support and engage a tutor in hopes of improvement or to enhance a competitive edge for their children. So far, the relationship between tutoring attendance and perceived individual learning support during classroom lessons has not been tested. We used multilevel analyses based on $N = 2,842$ students in 102 Grade 5 classrooms at German academic track schools to test for a relationship between private tutoring in several subjects and students’ shared perception of the instructional quality in these subjects. On the individual level, we controlled for typical predictors of private tutoring such as academic achievement and family income, as well as for additional variables such as working behaviour and parental homework assistance. In classrooms with more individual support, students were less likely to start private tutoring in English. However, we did not find comparable relationships for tutoring in mathematics and German. Therefore, school principals and educational policy-makers should monitor the incidence of private tutoring and consider within-school structured tutoring programmes as an effective measure to improve academic achievement and to meet parents’ desire for individualised instruction.

Keywords: private tutoring; shadow education; instructional quality; individual learning support

Introduction

School effectiveness is mostly seen in a school’s effectiveness to improve students’ cognitive and noncognitive outcomes, such as achievement and motivation (Reynolds et al., 2014). However, one could also ask whether parents and students are satisfied with a school’s support of an individual student’s academic development. Are families convinced that a school is optimally fostering each student’s academic potential?
Many students not only rely on instruction in school, but also attend private supplementary tutoring after school. Following Bray (2011), private (supplementary) tutoring refers to tutoring in academic subjects (e.g. languages, mathematics and sciences) to improve academic achievement. It is provided by tutors for financial gain and in addition to regular schooling. Because of its close relationship to mainstream schooling, it is also called shadow education. Extracurricular activities such as sports or within-school remedial lessons are excluded from this definition. Private tutoring is very common in East and South East Asian countries such as Japan, South Korea and Hong Kong. Northern and Western European countries traditionally have comparatively low tutoring rates, but there are indications and warnings of an increasing demand (Bray, 2011; Hille et al., 2016).

Studies on the demand factors of private tutoring mostly focus on student and family characteristics, and sometimes also on characteristics of the education system. However, one can argue that the high demand for private tutoring is an implicit criticism of the instructional quality of a school system, a specific school or a specific classroom (Dang & Rogers, 2008; Bray, 2009; Haag, 2015; Park et al., 2016). Demand for private tutoring would decrease if students in school received more individual support. At first glance, this argument is convincing: if instruction was optimally adapted to each student’s needs and optimally fostered each student’s academic development, there would be no need for further individualised instruction in the form of private tutoring. On the contrary, parents could generally see insufficient grades as an indicator of lacking support and engage a tutor in hopes of improvement. Either way, there is little empirical data on the relationship between the perceived instructional quality in the classroom and the individual demand for private tutoring. In the present study, we aimed to address this research gap by drawing on data from a German multilevel study that assessed the demand for private tutoring in three subjects (mathematics, English and German) in the first year of secondary schooling. The specific strengths of our data set are the comprehensive data on instructional quality for the three subjects, subject-specific information on private tutoring attendance and the use of standardised achievement tests for these subjects. Therefore, it had ideal preconditions to analyse classroom-level effects on the demand for private tutoring. Before presenting our analyses, the following section focuses on current discussions of, and findings on, individual-, classroom- and society-level factors that drive the demand for private tutoring.

**Demand factors of private tutoring**

Lee et al. (2009) suggest differing between macro-, meso- and micro-level factors that drive the demand for private tutoring. The macro level comprises shared belief systems within a society, the meso-level characteristics of the school system and the micro-level individual characteristics.

**Macro-level factors**

On the macro level, the demand for private tutoring is assumed to be increased by the characteristics of a meritocracy. If social values such as job opportunities and income
are allocated according to academic achievement measured by academic certificates, families foster their children’s educational development to maintain or increase the family’s social status. Private tutoring is a possible means to foster this development. The salary gap between those with and without tertiary education, and lower risks of unemployment for university graduates, are given as examples of this allocation process of social values. Further examples given are the level of unemployment benefit and a general fear of social decline and poverty. Macro-level factors are mainly important when explaining between-country variation or trends in the demand for private tutoring. These factors were of less relevance for our analyses, as we focused on Germany in the present study.

**Meso-level factors**

Meso-level factors are considered to relate the credentialism on the macro level to individual decisions for private tutoring. Lee et al. (2009) assigned the quality of public schooling and the role of high-stakes exams to this level. High-stakes tests, defined by their major consequences for the test taker, are widely accepted as the driving factor behind private tutoring (Park et al., 2016). However, at the beginning of German secondary schooling, they are of little relevance and, therefore, are not discussed here (Guill & Lintorf, 2019). Private tutoring is also discussed as a reaction to the deficiencies of school education. Evidence from international comparisons of tutoring rates (Baker et al., 2001; with more precise items on private tutoring: Byun et al., 2018) suggested that private tutoring is especially prominent in underfunded education systems with less than full enrolment rates. In extreme cases, teacher salaries are so low that teachers miss school hours or even hold back sections of the formal curriculum to force their students to attend their tutoring classes (Biswal, 1999; Bray, 2009). However, private tutoring is also present in well-funded school systems. Davies (2004) argued that, in education systems with full enrolment rates, parents strive for smaller educational settings with more personalised and tailored instruction, that is, either private schools or private tutoring, to secure a competitive edge for their children. Empirically, he showed that parents who prefer private schools but cannot afford them are more likely to engage private tutors for their children.

Those wishes of parents coincide with *individual learning support* as one of three basic dimensions of teaching quality (the others being the potential for cognitive activation and classroom management) identified by educational research (Kunter et al., 2013; Fauth et al., 2014). Individual learning support refers, on the one hand, to specific aspects of the teacher–student relationship such as motivational and emotional support and caring teacher behaviour. On the other hand, it refers to structuring measures to make demands of a learning situation manageable for each learner. The latter includes breaking down complex problems into manageable steps or making specific interventions when students encounter problems. Therefore, one can argue that classrooms with high levels of perceived individual learning support fulfil parents’ desire for more individualised and personalised instruction and reduce private tutoring. If parents are convinced that the teacher offers the best possible support for their child, even private tutoring would not result in a further competitive edge for the children.
Empirically, there is little systematic research on the effect of school or instructional quality on tutoring attendance. When asked directly, parents and students stated insufficient instructional quality and a lack of support in school as motives for attending private tutoring (Rudolph, 2002; Ireson & Rushforth, 2014). However, student-centred motives such as insufficient grades, study skills or working habits are more prominent motives. If parents are generally satisfied with the school system or the specific school, their children are less likely to attend private tutoring (Bregvadze, 2012), or parents spend less on it (Byun, 2014). Some studies address the effect of school-based support measures. While in South Korea the participation in after-school programmes was related to less tutoring attendance and lower tutoring expenses (Bae et al., 2010), there was no effect of homework assistance or courses on study techniques in German secondary schools (Guill, 2012). Other studies look at organisational measures. While Guill (2012) found no effect of class size on private tutoring attendance in Germany, there is evidence that less favourable student–teacher ratios in schools result in more money (Kim & Park, 2010) or time (Kim & Chang, 2010) being spent on tutoring in South Korea.

Concerning teacher qualification, in comprehensive qualitative analyses from several East European countries, insufficient professional competence and instructional quality is still considered the cause for high tutoring rates by different actors (education policy stakeholders, students; see Kirss & Jokić, 2013). In line with these findings, a higher ratio of qualified teachers at Vietnamese primary schools was connected with less money being spent on private tutoring (Dang, 2007). However, a similar effect was not found at secondary schools (Dang, 2007), and the ratio of teachers with a Master’s degree did not have an effect on tutoring rates in Israeli schools (Addi-Raccah & Dana, 2015).

In summary, evidence for the effect of school or instructional quality on private tutoring attendance is rather weak and mostly relies on global or distal indicators. To the best of our knowledge, no study yet has directly assessed measures of instructional quality, especially perceived individual learning support, and linked them to students’ tutoring attendance. Therefore, the main aim of our analyses was to test the hypothesis that students switch to private tutoring less frequently or continue earlier private tutoring less frequently if their need for individual support is met in the classroom.

Micro-level factors

Even within a single education system, not all students are equally likely to attend private tutoring. On the micro level, tutoring attendance can be explained theoretically by expectancy–value models of motivation (Lee et al., 2010), which are also prominent in explaining educational choices in the public education system (Breen & Goldthorpe, 1997). The basic idea is that expectations as well as values or beliefs affect subsequent behaviour. The individual initiates a certain type of behaviour if he or she expects to be able to succeed and if he or she values the behaviour in question, for example, in terms of interest, utility for future goals or acceptable costs (Wigfield & Eccles, 2000). Families opt for private tutoring if they expect it to improve their child’s academic achievement and if they believe the benefit of academic achievement and specific academic certificates to be greater than the (especially financial) burden
of tutoring. Reproducing families’ social status is seen as a strong motivator behind decisions not only for specific academic tracks (Breen & Goldthorpe, 1997), but also for private tutoring (Vincent & Maxwell, 2014; Entrich, 2015). As private tutoring costs are less relevant for wealthy families, tutoring attendance is theoretically and empirically dependent on families’ economic resources (Tansel & Bircan, 2006; Buchmann et al., 2010; Jung & Lee, 2010; Kim & Park, 2010; Guill, 2012; Hille et al., 2016). The effects of families’ economic resources might even be underestimated, as not all studies explicitly differentiate between paid and free private tutoring in their questionnaires (Bray & Kobakhidze, 2014). As predicted, there is evidence from qualitative (Kirss & Jokić, 2013) and quantitative analyses (Smyth, 2008; Guill, 2012) that private tutoring also increases in line with families’ educational aspirations and, as educational aspirations depend on social status (Boudon, 1974), with their social status (Smyth, 2008) or education level (Davies, 2004; Tansel & Bircan, 2006; Dang, 2007; Kim & Park, 2010). However, not all studies found these relationships (Buchmann et al., 2010; Guill, 2012).

The odds of realising one’s educational aspirations depend on one’s current academic achievement. In most countries, including Germany, low-achieving students are more likely to attend private tutoring than high achievers (Lee et al., 2010; Guill, 2012; Luplow & Schneider, 2014; Byun et al., 2018). South Korea and Ireland (Smyth, 2008; Lee et al., 2010) are among the few countries with a reversed relationship. In some studies, gender and ethnic or migration background are also related to tutoring attendance (Smyth, 2008; Buchmann et al., 2010; Lee et al., 2010; Guill, 2012). Families with a migration background might seek private tutoring more often because of their higher academic aspirations (Guill, 2012) and the traditional belief that private tutoring is an implicit part of students making an effort to do well in school (Byun & Park, 2012). Finally, private tutoring is not the only way to increase academic achievement. Parents might consider whether their child’s study behaviour and their own or older siblings’ ability to support the child are sufficient before engaging a tutor. This is consistent with a Taiwanese study showing that students with more siblings and positive study behaviour had slightly lower odds of attending a cram school in Grade 9 (Kuan, 2011).

In Germany, low academic achievement is a reliable and strong predictor of private tutoring (Guill, 2012; Luplow & Schneider, 2014; Hille et al., 2016; Guill & Lintorf, 2019). Hence, there are arguments that the instructional quality in the classroom does not influence the demand for private tutoring. Some students would always have insufficient grades, independent of instructional quality, as a result of bell-curve grading, and these grades would trigger the demand for private tutoring (Haag, 2015) to improve children’s academic and labour market chances.

Therefore, the main focus of our analyses was to test whether indeed a perceived supportive climate in a classroom goes along with a lower individual probability of attending private tutoring. Furthermore, we aimed to check whether, on the individual level, the relationships predicted by the expectancy–value models and prior research, especially the strong effect of academic achievement, would hold true for our sample at the beginning of German secondary schooling. Figure 1 provides a schematic overview of the predictors that were used in our analyses. Private tutoring attendance is assumed to be influenced by students’ characteristics, such as
achievement and working behaviour, families’ characteristics, such as income and assistance from parents and siblings, and classroom-level predictors, such as mean achievement and perceived instructional quality. We decided to control for mean achievement because of its known influence on students’ grades and ability self-concept (Trautwein et al., 2006).

Method

Data

Our data stem from a German project called ‘Ganz In – All-Day Schools for a Brighter Future. The New All-Day Secondary School in North Rhine-Westphalia’ (Berkemeyer et al., 2010). Ganz In is a longitudinal school development project that started in 2009. It aims to optimise the organisational structure of all-day secondary schools and to improve the instructional quality of lessons to enable students to realise their potential.

Ganz In focuses on academic-track schools. In most federal states in Germany, including North Rhine-Westphalia, after 4 years of primary schooling, students can continue either at academic-track schools or at one of several types of non-academic-track schools (Lohmar & Eckhardt, 2015). The final exam of the academic track

![Diagram of predictors]

Figure 1. Individual-, family- and classroom-level predictors of private tutoring attendance.
(Abitur) qualifies students for university admission. The non-academic tracks most often lead to further vocational education. Overall, high-achieving students attend academic-track schools.

Ganz In includes an evaluation process consisting of regular quantitative and qualitative assessments. The quantitative data are collected in a longitudinal design. This article draws on data from the first and second measurement points. In autumn 2010, at the beginning of Grade 5, students sat achievement tests in several subjects (see below), and students and parents provided information on the home learning environment. In summer 2011, at the end of Grade 5, students rated the instructional quality in several subjects and provided information about their private tutoring attendance.

Sample

The original sample consisted of 3,749 students nested in 123 classrooms in 31 schools. On the class level, we excluded classes in which no student filled out the questionnaire on instructional quality for at least one subject. On the individual level, students with missing data on all covariates (21 cases) were excluded. This resulted in an analytical sample of 2,842 students in 102 classrooms (mean 27.9 students) from 27 schools. Descriptive statistics for the analytical sample are given in Table 1.

Instruments

Private tutoring. The first tutoring item ‘Are you currently attending private tutoring [German: Nachhilfeunterricht] outside of your school?’ explicitly refers to out-of-school tutoring, but does not differentiate explicitly between paid and free private tutoring. Answers were possible for the subjects mathematics, English or German (decision for private tutoring: 1 = yes, 0 = no). Additional items measured the duration of these tutoring lessons (integrated to 0 = no private tutoring, 1 = up to 3 months of private tutoring, 2 = 4 or more months of private tutoring because tutoring rates of more than 6 months were too low for differentiated analyses) and the intensity of these tutoring lessons (integrated to 0 = no private tutoring, 1 = up to 1 hour of private tutoring per week, 2 = 2 hours or more of private tutoring per week).

Achievement tests (Grade 5). Regarding German, students took part in the Frankfurter Leseverständnistest (Frankfurt reading comprehension test; Souvignier et al., 2008), which consisted of a 570-word text and 18 comprehension questions (α = 0.72). The mathematics test consisted of 29 items comprising basic arithmetic operations (such as additions or multiplications), fractions, measurement units or number series (α = 0.86). To determine the students’ English text comprehension, a scale was used from the Evening study (Engel & Ehlers, 2013) consisting of 20 multiple-choice and four open-answer items (α = 0.71). Test items were recoded into dichotomous variables indicating wrong (0) and right answers (1). To obtain a single metric variable for each subject, a one-dimensional logistic item response model (Rasch, 1960) was calculated by using weighted likelihood estimators in ConQuest (Wu et al., 2007). To find an acceptable item fit, the thresholds were chosen in
Table 1. Characteristics of students with and without private tutoring in mathematics, English or German, based on complete cases (N\textsubscript{max} = 2,842)

|                         | Mathematics (8.8% with private tutoring) | English (8.9% with private tutoring) | German (6.6% with private tutoring) | Complete sample |
|-------------------------|------------------------------------------|--------------------------------------|----------------------------------|-----------------|
|                         | With private tutoring | Without private tutoring | With private tutoring | Without private tutoring | With private tutoring | Without private tutoring | With private tutoring | Without private tutoring | M  | SD  | M  | SD  | M  | SD  | M  | SD  |
| Achievement test score \(^{a,b}\) | -0.69 0.90 | 0.09 0.99 | -0.53 0.93 | 0.07 0.99 | -0.47 1.01 | 0.04 0.99 |                     |                     | 0.69 | 0.90 | 0.09 | 0.99 | 0.53 | 0.93 | 0.07 | 0.99 |
| Grade\(^a\)            | 2.32 0.63 | 1.87 0.62 | 1.93 0.55 | 1.76 0.61 | 2.17 0.60 | 1.83 0.58 |                     |                     | 2.32 | 0.63 | 1.87 | 0.62 | 1.93 | 0.55 | 1.76 | 0.61 |
| Study behaviour (range: 1–4) | 3.25 0.52 | 3.28 0.52 | 3.22 0.56 | 3.28 0.51 | 3.22 0.58 | 3.28 0.51 | 3.27 0.52 | 3.27 0.52 | 3.25 | 0.52 | 3.28 | 0.52 | 3.22 | 0.56 | 3.28 | 0.51 |
| Gender (reference: male) | 0.62 0.50 | 0.50 0.51 | 0.50 0.51 | 0.50 0.51 | 0.43 0.52 | 0.52 0.50 |                     |                     | 0.62 | 0.50 | 0.50 | 0.51 | 0.50 | 0.51 | 0.43 | 0.52 |
| Family income (range: 0–7) | 3.61 2.09 | 4.42 2.19 | 3.94 2.20 | 4.40 2.19 | 3.71 2.22 | 4.40 2.18 | 4.29 2.20 | 4.29 2.20 | 3.61 | 2.09 | 4.42 | 2.19 | 3.94 | 2.20 | 4.40 | 2.19 |
| Number of siblings (range: 0–4) | 1.43 1.10 | 1.27 0.94 | 1.43 1.17 | 1.26 0.93 | 1.39 1.16 | 1.27 0.94 | 1.30 0.97 | 1.30 0.97 | 1.43 | 1.10 | 1.27 | 0.94 | 1.43 | 1.17 | 1.26 | 0.93 |
| Parents with qualification for university entrance\(^c\) | 0.55 0.69 | 0.55 0.69 | 0.57 0.69 | 0.69 0.69 | 0.57 0.69 | 0.69 0.69 | 0.68 0.47 | 0.68 0.47 | 0.55 | 0.69 | 0.55 | 0.69 | 0.57 | 0.69 | 0.67 | 0.47 |
| Native language (reference: German) | 0.39 0.24 | 0.36 0.24 | 0.36 0.24 | 0.42 0.24 | 0.42 0.24 | 0.25 0.44 |                     |                     | 0.39 | 0.24 | 0.36 | 0.24 | 0.36 | 0.24 | 0.36 | 0.24 |
| Number of books at home (range: 0–4) | 2.19 1.15 | 2.51 1.15 | 2.28 1.22 | 2.50 1.15 | 2.21 1.10 | 2.51 1.15 | 2.48 1.15 | 2.48 1.15 | 2.19 | 1.15 | 2.51 | 1.15 | 2.28 | 1.22 | 2.50 | 1.15 |
| Homework assistance from parents\(^d\) | 0.86 0.82 | 0.86 0.82 | 0.81 0.82 | 0.82 0.82 | 0.81 0.82 | 0.82 0.82 | 0.82 0.39 | 0.82 0.39 | 0.86 | 0.82 | 0.86 | 0.82 | 0.81 | 0.82 | 0.82 | 0.39 |
| Homework assistance from siblings\(^d\) | 0.33 0.20 | 0.20 0.21 | 0.25 0.21 | 0.21 0.21 | 0.25 0.21 | 0.20 0.21 | 0.21 0.41 | 0.21 0.41 | 0.33 | 0.20 | 0.20 | 0.21 | 0.25 | 0.21 | 0.20 | 0.21 |
| Internal differentiation (range: 1–4) | 2.33 0.62 | 2.31 0.56 | 2.19 0.62 | 2.17 0.58 | 2.13 0.63 | 2.13 0.55 |                     |                     | 2.33 | 0.62 | 2.31 | 0.56 | 2.19 | 0.62 | 2.17 | 0.58 |
| Individual support (range: 1–4) | 3.18 0.68 | 3.22 0.62 | 3.08 0.69 | 3.13 0.65 | 3.16 0.68 | 3.18 0.61 |                     |                     | 3.18 | 0.68 | 3.22 | 0.62 | 3.08 | 0.69 | 3.13 | 0.65 |

\(^a\) Mathematics or English or German.
\(^b\) \(z\)-Standardised on the individual level.
\(^c\) Reference: no qualification for university entrance.
\(^d\) Reference: seldom or never.
accordance with common guidelines used in large-scale assessment studies (Adams & Wu, 2002). Items that did not conform to the model were excluded.

Mean class achievement was calculated as the class mean of $z$-standardised individual achievement scores.

Further individual variables. Grades were reported by the students and refer to the final grades in primary school (i.e. end of Grade 4). Therefore, they mostly comprise the values (1) very good, (2) good and (3) sufficient.

Parents reported on the students’ study behaviour (adapted from Bos et al., 2009) on a six-item rating scale ranging from (1) does not apply to (4) fully applies, comprising items such as ‘My child works diligently for school’, with an internal consistency of $\alpha = 0.77$.

Gender, stated by the students, was coded (0) boys and (1) girls.

Annual family income was reported by the parents in groupings of €10,000, ranging from (0) under €10,000 to (7) over €70,000. The number of siblings reported by the students was coded from (0) no siblings to (4) four or more siblings.

Concerning school-related cultural resources in the home (Bourdieu, 1977), students reported whether their parents qualified for university entrance (1) or not (0). Migration background was coded if German was not the student’s native language (1). Additionally, students stated the number of books at home in five categories from (0) none or very few/up to 10 to (4) enough to fill three shelves or more.

Students stated how often parents and older siblings helped them when doing homework, which was coded (0) for no or seldom help, that is, once or twice per month and (1) for frequent help, at least on a weekly basis. Homework assistance from siblings was coded as 0 if students reported having no older siblings.

Instructional quality. For each subject, students evaluated the instructional quality with a number of scales. For our analyses, we focused on two scales covering the two aspects of individual learning support. The first aspect was individual differentiation (five items, e.g. ‘Our mathematics/English/German teacher assigns tasks of varying difficulty according to achievement level’, rating from (1) never to (4) in each lesson, $\alpha_{\text{mathematics}} = 0.58$, $\alpha_{\text{English}} = 0.61$, $\alpha_{\text{German}} = 0.60$; Mullis et al., 2003; Frey et al., 2009). The second aspect was empathy and individual support (five items, e.g. ‘Our [...] teacher strives to ensure that everyone in the classroom can keep up with the lessons’, rating from (1) does not apply at all to (4) fully applies, $\alpha_{\text{mathematics}} = 0.76$, $\alpha_{\text{English}} = 0.78$, $\alpha_{\text{German}} = 0.76$; Ditton & Merz, 2000). The full list of items can be found in the online supplementary material. Scales were calculated as manifest mean values if at least 60% of the items was completed.

In this study, we distinguish between instructional quality as an individual-level and a class-level predictor of tutoring attendance. Therefore, we aggregated students’ perceptions of individual differentiation and individual support at the class level. The reliability of the class-aggregated individual student ratings can be estimated with the intraclass correlation coefficients ICC(1) and ICC(2). ICC(1) reflects the proportion of variance attributable to differences between classes (Raudenbush & Bryk, 2002). The higher the value of ICC(1), the more similar the ratings of the students in a given class relative to the total variance. The ICC(1) value for individual differentiation in
mathematics was 0.11 (English: 0.14, German: 0.11) and that for individual support was 0.15 (English: 0.18, German: 0.16), indicating that 11% of the variance in individual differentiation and 15% of the variance in individual support can be attributed to differences between classes. ICC(2) provides an estimate of the reliability of the class-mean rating and is calculated by applying the Spearman–Brown prophecy formula to ICC(1). The ICC(2) value for internal differentiation in mathematics was 0.76 (English: 0.81, German: 0.75) and that for individual support was 0.82 (English: 0.84, German: 0.82), indicating a satisfactory reliability of the mean class ratings (Lüdtke et al., 2009). Note that our approach (latent covariate modelling; see Analyses) accounted for the imperfect reliability of aggregated student reports at the class level.

Analyses

The dependent variables of our analyses were either binary (decision for private tutoring) or were ordered categorically (duration and intensity). Therefore, we used multilevel logistic regression analyses with the logit function as link function between the linear combination of the predictors of tutoring attendance and the actual binary or ordered categorical outcomes (Heck & Thomas, 2015). Regression coefficients are reported as logit coefficients, which are—to ease interpretation—converted into odds ratios \( OR = e^\beta \). Odds ratios represent the odds of attending private tutoring given a certain characteristic (or its one unit increase) compared to the odds of not attending private tutoring that occur in the absence of this characteristic. In the case of an ordered categorical outcome, they refer to the odds of being in a higher category of the outcome variable rather than being in one of the lower categories.

As we focused on the effect of perceived instructional quality, which is a classroom-level variable, multilevel modelling was the appropriate choice. On the class level, our models had three predictors: two measures of instructional quality and the mean achievement level. To account for the imperfect reliability of aggregated student ratings of individual differentiation and individual support, we used the multilevel latent covariate approach (MLC) implemented in Mplus (Muthén & Muthén, 1998–2014; see also Lüdtke et al., 2008). The MLC approach corrects the unreliable assessment of the group mean when estimating group-level effects by taking into account the fact that only a finite number of students provide ratings of the instructional quality dimensions.

We report \( x \)-standardised logit coefficients in the case of predictors where the value 0 was not interpretable and non-standardised logit coefficients in all other cases (Heck & Thomas, 2015).

Due to individual nonresponse, some students had missing data on some variables. Missing data rates were around 5% for most of the variables from the student questionnaires, around 10% for variables on instructional quality, and reached a peak of 30.8% for family income. We used the full information maximum likelihood approach implemented in Mplus to account for the missing values (see Enders, 2010).
Results

Table 1 gives a descriptive overview of the characteristics of tutored and non-tutored students in each subject. They mostly differed in their school achievement, with tutored students coming from primary school with poorer grades and starting Grade 5 with lower achievement test results. Girls were overrepresented in mathematics tutoring attendance, boys in German tutoring attendance. Descriptively, the tutored group had a lower family income and a higher number of students whose native language was not German. Both groups often obtained parental assistance with homework and reported rather similarly on the instructional quality of their school lessons.

Correlations between the predictor variables were mostly low (Table 2). On the individual level, especially in mathematics, there was a medium correlation between primary-school grades and achievement test results. Family income and number of books at home correlated positively with the parents’ qualification for university admission and negatively with the child’s native language not being German. Correlations between both indicators of perceived instructional quality hardly reached a medium effect size on the individual level and were a bit larger, but still of medium size, on the class level. Mean achievement was only very weakly correlated with mean instructional quality.

As Table 3 shows, the private tutoring indicators for different subjects were mostly moderately positively correlated; only private tutoring duration for English and German was nearly perfectly correlated: \( r = 0.93 \). With the exception of the duration of private tutoring in mathematics and English, all indicators of private tutoring attendance showed significant variance on the class level, with intraclass correlations varying between 4% and 16%.

The results of the multilevel analyses conducted to examine the predictors of the decision for tutoring, its duration and its intensity for the three subjects are presented in Table 4. We present the results for the decision to attend private tutoring in mathematics in more detail and then comment on differences in the prediction of the duration and intensity of tutoring. Afterwards, we present the results for English and German tutoring compared to tutoring in mathematics. We focus on statistically significant effects \((p < 0.05)\). However, marginally significant effects \((p < 0.10)\) are also displayed in Table 4.

The indicators of individual achievement were the only significant predictors of the decision for private tutoring in mathematics. A Grade 5 test achievement score increased by one standard deviation halved the likelihood of attending private tutoring \((OR = 0.51)\). Similarly, a primary-school grade in mathematics that was one standard deviation poorer increased the likelihood of private tutoring \((OR = 1.66)\). In contrast, no effect was found for the individual characteristics of the students (gender, study behaviour), family background (income, number of siblings, parents’ academic qualifications, migration background) or direct homework support by family members. Most importantly, neither students’ individual perception nor students’ shared perceptions of the individual learning support in the classroom had an effect. The pattern of effects was the same for the duration and intensity of private tutoring in mathematics.
Table 2. Correlations between predictors of private tutoring attendance on the individual (lower left triangle) and classroom level (higher right triangle)

|   | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| (1) Achievement test score | | | | | | | | | | | | | |
| M | 1.00 | 1.00 | 1.00 | | | | | | | | | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (2) Grade | | | | | | | | | | | | | |
| M | -0.358 | -0.229 | -0.190 | 1.00 | 1.00 | 1.00 | | | | | | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (3) Study behaviour | | | | | | | | | | | | | |
| M | | | | | | | | | | | | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (4) Gender | | | | | | | | | | | | | |
| M | -0.229 | 0.148 | 0.127 | 0.163 | -0.058 | -0.135 | -0.196 | 1.00 | | | | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (5) Family income | | | | | | | | | | | | | |
| M | 0.130 | 0.089 | 0.130 | 0.046 | 0.031 | 0.085 | 0.026 | 0.012 | -0.091 | 1.00 | | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (6) Number of siblings | | | | | | | | | | | | | |
| M | 0.096 | 0.102 | 0.155 | -0.052 | -0.052 | -0.090 | -0.073 | 0.022 | 0.406 | -0.081 | 1.00 | | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (7) Parents with qualification for university | | | | | | | | | | | | | |
| M | -0.124 | -0.044 | -0.195 | 0.039 | -0.030 | 0.164 | 0.153 | 0.023 | -0.396 | 0.154 | -0.253 | 1.00 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (8) Native language | | | | | | | | | | | | | |
| M | 0.147 | 0.110 | 0.174 | -0.078 | -0.088 | -0.144 | -0.111 | -0.008 | 0.325 | -0.013 | 0.317 | -0.311 | 1.00 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (9) Number of books at home | | | | | | | | | | | | | |
| M | -0.122 | -0.065 | 0.033 | 0.083 | 0.031 | 0.019 | -0.042 | 0.074 | 0.044 | -0.053 | 0.087 | -0.090 | 0.005 | 1.00 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (10) Homework assistance from parents | | | | | | | | | | | | | |
| M | -0.122 | -0.074 | -0.119 | 0.073 | -0.026 | 0.081 | 0.051 | 0.047 | -0.104 | 0.267 | -0.083 | 0.193 | -0.72 | 0.174 | 1.00 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (11) Homework assistance from siblings | | | | | | | | | | | | | |
| M | 0.035 | 0.008 | 0.008 | | | | | | | | | | |
| E | 0.008 | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (12) Internal differentiation | | | | | | | | | | | | | |
| M | -0.002 | -0.002 | 0.009 | 0.009 | 0.041 | 0.064 | -0.016 | 0.032 | -0.043 | 0.071 | 0.012 | 0.003 | 1.00 | 0.321 | 0.419 | 1.00 | 0.313 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| (13) Individual support | | | | | | | | | | | | | |
| M | 0.049 | 0.010 | 0.027 | 0.002 | 0.003 | 0.025 | -0.001 | -0.001 | 0.003 | 0.003 | 0.025 | -0.001 | -0.013 | 0.022 | -0.044 | 0.013 | 0.030 | 0.010 | 0.280 | 1.00 | |
| E | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |

Note: Significant correlations ($p < 0.05$) are printed in bold and marginally significant correlations ($p < 0.10$) in italics. M = Mathematics, E = English, G = German.

*Mathematics or English or German.

Reference: no qualification for university entrance.

Reference: seldom or never.

In either mathematics or English or German lessons.
Concerning the decision for private tutoring in English, test achievement was of similar importance as for mathematics ($OR = 0.52$), but the effect of the primary-school grade, though significant, was smaller ($OR = 1.19$). Students with a migration background were more likely to attend private tutoring in English ($OR = 1.62$). As was the case for mathematics, there were no further significant predictors of private tutoring in English on the individual level. However, on the class level, the shared perception of the teacher’s individual support had a negative effect. If this support was increased by one standard deviation, the individual student’s odds of attending private tutoring in English were reduced to $OR = 0.71$. Or, in other words, while the probability of a student with all predictors being zero attending private tutoring was 5.0%, this probability reduced to 3.6% if the teacher’s individual support was one standard deviation above the average and it increased to 6.9% if the teacher’s individual support was one standard deviation below the average of all classes.

The pattern of results is similar for the duration and intensity of private tutoring in English. However, neither students’ primary-school grades nor teachers’ individual support on the class level had significant effects. Students with a more positive study behaviour were less likely to receive intensive private tutoring in English ($OR = 0.84$).

Concerning the decision for private tutoring in German, test achievement ($OR = 0.44$) and primary-school grades ($OR = 1.55$) were of similar importance as for mathematics. As was the case for English, students with a migration background were more likely to attend private tutoring in German ($OR = 1.97$). As was the case for both mathematics and English, there were no further significant predictors of private tutoring in English on the individual level. Classroom-level predictors also did not have any significant effects. The pattern of results is similar for the duration and intensity of private tutoring in German. However, migration background did not have a significant effect on the duration of tutoring. Similar to the results for English tutoring intensity, students with a more positive study behaviour were less likely to receive intensive private tutoring in German ($OR = 0.81$).

**Discussion**

On the class level, we were indeed able to show a relationship between the perceived instructional quality in the classroom and individual students’ private tutoring
Table 4. Prediction of private tutoring attendance, its duration and intensity, in mathematics, English and German (logit coefficients)

| Dependent variable | Private tutoring in mathematics | Private tutoring in English | Private tutoring in German |
|--------------------|--------------------------------|-----------------------------|---------------------------|
| Achievement test score | -0.68 (0.10) -0.69 (0.10) -0.71 (0.10) | -0.66 (0.09) -0.57 (0.13) -0.63 (0.09) | -0.44 (0.10) -0.45 (0.13) -0.41 (0.10) |
| Grade | 0.51 (0.09) 0.53 (0.09) 0.53 (0.09) | 0.17 (0.08) 0.17 (0.12) 0.15 (0.08) | 0.44 (0.10) 0.36 (0.12) 0.37 (0.10) |
| Study behaviour | -0.15 (0.09) -0.15 (0.09) -0.15 (0.09) | -0.16 (0.09) -0.13 (0.12) -0.18 (0.09) | -0.17 (0.10) -0.09 (0.13) -0.21 (0.10) |
| Gender (reference: male) | 0.08 (0.17) 0.13 (0.18) 0.10 (0.17) | 0.20 (0.16) -0.02 (0.23) 0.13 (0.16) | -0.20 (0.19) -0.04 (0.23) -0.24 (0.19) |
| Family income | -0.08 (0.05) -0.09 (0.05) -0.07 (0.05) | 0.01 (0.05) 0.00 (0.07) -0.02 (0.05) | -0.07 (0.06) -0.05 (0.07) -0.07 (0.06) |
| Number of siblings | 0.02 (0.09) 0.02 (0.09) 0.05 (0.09) | 0.08 (0.08) 0.18 (0.11) 0.11 (0.08) | -0.02 (0.10) 0.12 (0.11) 0.07 (0.10) |
| Parents with qualification for university entrance | -0.27 (0.20) -0.23 (0.20) -0.19 (0.20) | -0.35 (0.20) -0.17 (0.28) -0.33 (0.20) | 0.04 (0.23) -0.02 (0.27) -0.02 (0.23) |
| Native language (reference: German) | 0.32 (0.20) 0.30 (0.20) 0.33 (0.20) | 0.48 (0.20) 0.82 (0.27) 0.55 (0.19) | 0.68 (0.23) 0.28 (0.27) 0.76 (0.23) |
| Number of books at home | -0.06 (0.08) 0.02 (0.08) -0.06 (0.08) | 0.00 (0.07) -0.07 (0.10) 0.03 (0.07) | -0.04 (0.09) -0.15 (0.11) -0.02 (0.09) |
| Homework assistance from parents | -0.04 (0.24) 0.05 (0.26) -0.03 (0.24) | 0.30 (0.24) 0.29 (0.33) 0.23 (0.23) | 0.10 (0.25) 0.45 (0.35) 0.05 (0.25) |
| Homework assistance from siblings | 0.39 (0.22) 0.41 (0.22) 0.27 (0.22) | 0.00 (0.23) -0.15 (0.31) 0.07 (0.22) | -0.08 (0.26) 0.06 (0.30) -0.07 (0.25) |
| Internal differentiation | 0.10 (0.09) 0.12 (0.09) 0.17 (0.09) | 0.12 (0.09) 0.18 (0.12) 0.13 (0.09) | 0.01 (0.10) 0.11 (0.12) 0.04 (0.09) |
| Individual support | -0.06 (0.09) -0.09 (0.09) -0.13 (0.09) | -0.02 (0.09) -0.04 (0.13) -0.08 (0.09) | -0.02 (0.10) -0.04 (0.12) -0.05 (0.10) |
| Achievement level | 0.17 (0.27) 0.14 (0.27) 0.07 (0.27) | 0.45 (0.28) -0.08 (0.36) 0.44 (0.26) | -0.08 (0.38) -0.32 (0.40) 0.01 (0.40) |
| Internal differentiation | -0.16 (0.12) -0.15 (0.13) -0.20 (0.12) | 0.03 (0.15) 0.13 (0.20) 0.03 (0.14) | -0.15 (0.16) -0.11 (0.16) -0.13 (0.16) |
| Individual support | 0.02 (0.13) 0.02 (0.13) 0.04 (0.13) | -0.34 (0.15) -0.22 (0.20) -0.25 (0.15) | 0.08 (0.16) -0.04 (0.17) 0.05 (0.17) |
| Intercept or thresholds | First | 2.57 (0.38) 2.90 (0.40) 2.72 (0.39) | 2.94 (0.38) 3.83 (0.53) 2.87 (0.37) | 3.08 (0.41) 3.75 (0.52) 3.15 (0.42) |
| | Second | 3.98 (0.41) 3.82 (0.40) 4.56 (0.54) 3.90 (0.38) | 4.66 (0.54) | 4.13 (0.43) |
| Individual level | 0.21 (0.03) 0.21 (0.03) 0.22 (0.03) | 0.15 (0.03) 0.15 (0.04) 0.15 (0.03) | 0.14 (0.03) 0.12 (0.04) 0.13 (0.03) |
| Class level | 0.09 (0.11) 0.09 (0.12) 0.11 (0.12) | 0.29 (0.14) 0.10 (0.16) 0.24 (0.16) | 0.02 (0.05) 0.04 (0.06) 0.02 (0.04) |

Note: Significant effects (p < 0.05) are printed in bold and marginally significant effects (p < 0.10) in italics.

a Mathematics or English or German.
b-x-Standardised on the individual level.
cReference: no qualification for university entrance.
dReference: seldom or never.
e-x-Standardised on the class level.
attendance. If students ascribed a high level of empathy and individual support to their English teachers, the individual student had a lower probability of taking up private tutoring in English. We found this effect when controlling for numerous covariates on the individual level. To the best of our knowledge, this is the first time that a direct relationship has been shown between instructional quality measured by students’ shared perceptions and private tutoring. However, we found this effect only regarding the decision for private tutoring in English and not for the duration and intensity or private tutoring in mathematics or German. These differences between the subjects need to be confirmed in future studies. The reason for the differences may be differences in the significance of the subjects in primary schooling.

German and mathematics are main subjects in primary school. Thus, at the end of primary schooling, parents have already carefully monitored their child’s progress in these subjects for four years. When deciding on private tutoring, parents might rely completely on their own evaluation of the child’s academic achievement. English, in contrast, is a minor subject in primary school, but becomes a major subject—with more weekly hours of instruction—at the beginning of secondary school. Content becomes more serious, switching from basic oral communication skills to systematic instruction of grammar and written expression. As this shifted focus of instruction is rather new, parents might be more willing to wait and see if their children perceive (sufficient) individual support from the teacher before organising private tutoring, even if their children’s first grades in English are low. In this case, subject-specific differences found at the beginning of secondary schooling should disappear during the following years.

On the individual level, the results of our analyses are at least partly in line with previous findings. As expected, we found strong and consistent relationships between individual achievement and different indicators of private tutoring attendance. Students with worse grades at the end of primary school and lower achievement test results at the beginning of secondary school were more likely to attend private tutoring, for a longer time and for more hours per week. The effect of primary-school grades in English on private tutoring attendance in secondary school might be small due to a shift of focus in instruction. In primary school, English instruction is more focused on oral competencies and, in secondary school, it comprises the systematic introduction of grammar and writing competencies. This might reduce the predictive value of the primary-school grades. In future studies, the use of grades from Year 5 would be optimal. However, we were able to partially compensate for this deficit by using Year-5 achievement tests. Additionally, our results indicated that students with better study behaviour attended less intensive private tutoring. In other words, the improvement of study skills might be seen as an additional motivation to attend private tutoring.

Interestingly, there was no relationship between family income or parents’ academic qualifications and tutoring attendance. At this early stage of secondary schooling, parents may be able to support their children themselves, independent of their own academic qualifications. It would be informative to repeat the same analyses for older students when learning content becomes more complex. The lack of income

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1https://www.schulministerium.nrw.de/docs/Schulsystem/Schulformen/Grundschule/Von-A-bis-Z/Stundentafel/index.html

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effects on tutoring attendance might also be due to the fact that we did not explicitly ask for differentiation between paid and free private tutoring (Bray & Kobakhidze, 2014). Additionally, our data did not make it possible to check whether wealthier parents chose more expensive and more high-quality tutoring for their children. Information on parents’ aspirations as predictors of tutoring attendance (Entrich, 2015) was not available, but as our sample was limited to academic-track schools, almost all parents can be expected to aspire to their children qualifying for university admission.

Parents with a migration background may have less knowledge about the German school system and might therefore rely more heavily on private tutoring than parents without a migration background. This may result in higher tutoring rates for children whose parents have a migration background. The effect of migration background was not statistically significantly different from zero for private tutoring in mathematics, and the effect for mathematics was not statistically smaller than the effect for English or German tutoring.

We did not find any relationship between parental homework assistance and tutoring attendance. As nearly all students stated that they received assistance, this indicator had little variance. Future studies should focus on the quality of parents’ support (Dumont et al., 2014) and parents’ self-efficacy in supporting their children. Especially low-achieving children receive more low-quality parental homework support, that is, more pressure and control instead of structure and responsiveness, and there are more conflicts about homework completion in these families (Moroni et al., 2016). Future studies should consider whether parents engage private tutors to mitigate the conflicts about homework completion or, more generally, conflicts about learning at home. Research on the quality of homework assistance given by siblings is also missing.

Much theorising on the demand factors of private tutoring focuses on parents’ motives and on parents striving for a competitive edge for their children. However, students might have their own motives to ask for private tutoring. They might imitate peers who describe the tutor’s support as a positive experience. They might have little confidence concerning their academic ability and seek the support of an expert. Or they might have little trust in both their parents’ and their classroom teachers’ support. Future studies should therefore differentiate between parents’ and students’ motives for engaging in private tutoring.

**Strengths and limitations**

Our study has several strengths. We drew on very precise tutoring data, differentiating between three subjects, tutoring duration and tutoring intensity. For all three subjects, we had differentiated data on the instructional quality of classroom instruction. The large number of quite big classes in our sample allowed a reliable measurement of instructional quality on the classroom level. The data structure was longitudinal in the sense that individual and family characteristics were measured before private tutoring attendance. For future studies, it would be preferable to measure the instructional quality before the start of the tutoring classes so that ratings of classroom instructional quality cannot be influenced by the alternative experience in the tutoring lessons.

Our study also has some limitations. We relied on a regional data set from only one track type. The sample is not representative and, unfortunately, there was a high
dropout rate of complete classes from the study. Future studies should focus on different age cohorts, especially from grade levels with higher tutoring rates (e.g. Grades 8 to 10; Hille et al., 2016) and from different academic tracks. Unfortunately, further measurement points of the Ganz In study did not include items on private tutoring (Berkemeyer et al., 2010).

Furthermore, our study is a snapshot of a specific time point. The focus was on individual- and class-level predictors of private tutoring and was not able to include an analysis of the impact of the social context. Future research should focus (both theoretically and analytically) on the social circumstances in which parents feel obliged to engage private tutors for their children (Vincent & Maxwell, 2014).

Practical implications and future outlook

Individual learning support is one of the three core dimensions of instructional quality. It is especially predictive for student motivation (Fauth et al., 2014). As our analyses reveal, a perceived supportive climate in the classroom has a further benefit: at least in a subject with a new focus and role, such as the first foreign language, individual learning support relieves the pressure on students and families to engage in private tutoring when the first difficulties arise. Thus, students and families save a lot of time and money, which can thus be invested in extracurricular activities.

However, the same effect could not be shown for private tutoring in mathematics and the native language. Irrespective of whether classroom instruction was perceived as being more or less supportive, parents tended to choose private tutoring for their children as soon as they showed low academic achievement. From this perspective, our results are rather disillusioning. Presuming that these tutoring lessons indeed improve academic achievement (which is far from a conclusive research result; see Park et al., 2016 and most recently Guill et al., 2019), school principals and educational policy-makers should at least monitor the extent to which private tutoring attendance depends on parents’ financial situation. Within-school structured free-of-charge tutoring programmes have been shown to be an effective measure to improve reading and mathematics achievement (Slavin et al., 2011; Pellegrini et al., 2018). These programmes are independent of parents’ financial situation and, therefore, do not lead to any ‘shaming’ as there is no connection to a family’s resources. They correspond to parents’ desire for individualised instruction and might relieve the pressure to seek private tutoring to some extent. However, most probably, not all parents will stop looking for a competitive edge for their children.

From a research perspective, a replication of our findings in different countries would be interesting, particularly in those countries where especially high-achieving students attend private tutoring. The tutoring decision in this case could be expected to depend less on the level of perceived classroom support and more on the level of challenge and cognitive activation in the classroom.

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Data availability statement
Research data are not shared.

Declaration of interest
None.

Ethical guidelines
Ethics approval was not required for this study.

References
Adams, R. & Wu, M. (2002) *PISA 2000 technical report* (Paris, OECD).
Addi-Raccah, A. & Dana, O. (2015) Private tutoring intensity in schools: A comparison between high and low socio-economic schools, *International Studies in Sociology of Education*, 25, 183–203.
Bae, S., Oh, H., Kim, H., Lee, C. & Oh, B. (2010) The impact of after-school programs on educational equality and private tutoring expenses, *Asia Pacific Education Review*, 11, 349–361.
Baker, D. P., Akiba, M., LeTendre, G. K. & Wiseman, A. W. (2001) Worldwide shadow education: Outside-school learning, institutional quality of schooling, and cross-national mathematics achievement, *Educational Evaluation and Policy Analysis*, 23, 1–17.
Berkemeyer, N., Bos, W., Holtappels, H. G., Meetz, F. & Rollett, W. (2010) ‘Ganz In’: Das Ganztagsgymnasium in Nordrhein-Westfalen ['Ganz In': The academic track school in North-Rhine Westphalia], in: N. Berkemeyer, W. Bos, H. G. Holtappels, N. McElvaney & R. Schulz-Zander (Eds) *Jahrbuch der Schulentwicklung*, Band 16 (Weinheim, Beltz), 131–152.
Biswal, B. P. (1999) The implications of private tutoring on the school education in LDCs, *Journal of Economic Policy Reform*, 3, 53–66.
Bos, W., Bonsen, M., Kummer, N., Lintorf, K. & Frey, K. (2009) *TIMSS 2007. Dokumentation der Erhebungsinstrumente zur Trends in International Mathematics and Science Study [TIMSS 2007. Documentation of instruments]* (Münster, Waxmann).
Boudon, R. (1974) *Education, opportunity, and social inequality. Changing prospects in western society* (New York, Wiley).
Bourdieu, P. (1977) *Outline of a theory of practice* (vol. 16) (Cambridge, Cambridge University Press).
Bray, M. (2009) *Confronting the shadow education system: What government policies for what private tutoring?* (Paris, UNESCO/International Institute for Educational Planning).
Bray, M. (2011) *The challenge of shadow education: Private tutoring and its implications for policy makers in the European Union* (Luxembourg, European Commission).
Bray, M. & Kobakhidze, M. N. (2014) Measurement issues in research on shadow education: Challenges and pitfalls encountered in TIMSS and PISA, *Comparative Education Review*, 58, 590–620.
Breen, R. & Goldthorpe, J. H. (1997) Explaining educational differentials: Towards a formal rational action theory, *Rationality and Society*, 9, 275–305.
Bregvadze, T. (2012) Analysing the shadows: Private tutoring as a descriptor of the education system in Georgia, *International Education Studies*, 5, 80–89.
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Buchmann, C., Condron, D. J. & Roscigno, V. J. (2010) Shadow education, American style: Test preparation, the SAT and college enrollment, Social Forces, 89, 435–462.

Byun, S.-Y. (2014) Shadow education and academic success in Republic of Korea, in: H. Park & K.-K. Kim (Eds) Korean education in changing economic and demographic contexts (Dordrecht, Springer Science+Business Media), 39–58.

Byun, S.-Y. & Park, H. (2012) The academic success of East Asian American youth: The role of shadow education, Sociology of Education, 85, 40–60.

Byun, S.-Y., Chung, H. & Baker, D. (2018) Global patterns of the use of shadow education: Student, family, and national influences, Research in the Sociology of Education, 20, 75–105.

Dang, H.-A. (2007) The determinants and impact of private tutoring classes in Vietnam, Economics of Education Reviews, 26, 683–698.

Dang, H.-A. & Rogers, F. H. (2008) The growing phenomenon of private tutoring: Does it deepen human capital, widen inequalities, or waste resources? The World Bank Research Observer, 23, 161–200.

Davies, S. (2004) School choice by default?: Understanding the demand for private tutoring in Canada, American Journal of Education, 110, 233–255.

Ditton, H. & Merz, D. (2000) Qualität von Schule und Unterricht. Kurzbericht über erste Ergebnisse einer Untersuchung an bayerischen Schulen [Quality of school and teaching. Short report on the first results of an investigation in Bavarian schools] (Eichstätt, Catholic University of Eichstätt/University of Osnabrück).

Dumont, H., Trautwein, U., Nagy, G. & Nagengast, B. (2014) Quality of parental homework involvement: Predictors and reciprocal relations with academic functioning in the reading domain, Journal of Educational Psychology, 106, 144–161.

Enders, C. K. (2010) Applied missing data analysis (New York, Guilford Press).

Engel, G. & Ehlers, G. (2013) Hören – Zuhören – Verstehen: Möglichkeiten der Analyse, Diagnose und gezielten Förderung des Hörverstehens [Hearing – listening – comprehending. Options for analysing, diagnosis and fostering of listening comprehension], in: O. Börner, G. Engel & B. Groot-Wilken (Eds) Hörverstehen, Leseverstehen, Sprechen. Diagnose und Förderung von sprachlichen Kompetenzen im Englischunterricht der Primarstufe [Listening comprehension, reading comprehension, speaking. Diagnosis and promotion of language skills in English teaching in primary school] (Münster, Waxmann), 44–69.

Entrich, S. R. (2015) The decision for shadow education in Japan: Students’ choice or parents’ pressure? Social Science Japan Journal, 18(2), 193–216.

Fauth, B., Decristan, J., Rieser, S., Klieme, E. & Büttner, G. (2014) Student ratings of teaching quality in primary school: Dimensions and prediction of student outcomes, Learning and Instruction, 18(2), 1–9.

Frey, A., Taskinen, P., Schütte, K., Prenzel, M., Artelt, C., Baumert, J. ... & Pekrun, R. (2009) PISA 2006 Skalenhandbuch. Dokumentation der Erhebungsinstrumente [PISA 2006 scales book. Documentation of survey tools] (Münster, Waxmann).

Guill, K. (2012) Nachhilfeunterricht. Individuelle, familiäre und schulische Prädiktoren [Private tutoring. Individual, family and school level predictors] (Münster, Waxmann).

Guill, K. & Lintorf, K. (2019) Private tutoring when stakes are high: Insights from the transition from primary to secondary school in Germany, International Journal of Educational Development, 65, 172–182.

Guill, K., Lüdtke, O. & Köller, O. (2019) Assessing the instructional quality of private tutoring and effects on student outcomes: Analyses from the German National Educational Panel Study, British Journal of Educational Psychology, https://doi.org/10.1111/bjep.12281

Haag, L. (2015) Nachhilfe im Spannungsfeld zwischen Schule und Elternhaus – wirklich im Spannungsfeld? [Tutoring between school and home – are tensions inevitable?], Familiendynamik, 40(1), 30–37.

Heck, R. H. & Thomas, S. L. (2015) An introduction to multilevel modeling techniques: MLM and SEM approaches using Mplus (3rd edn) (New York, Routledge).

Hille, A., Spieβ, C. K. & Staneva, M. (2016) More and more students, especially those from middle-income households, are using private tutoring, DIW Economic Bulletin, 6. Available online

© 2019 The Authors. British Educational Research Journal published by John Wiley & Sons Ltd on behalf of British Educational Research Association.
Ireson, J. & Rushforth, K. (2014) Why do parents employ private tutors for their children? Exploring psychological factors that influence demand in England, *Journal for Educational Research Online*, 6, 12–33.

Jung, J. H. & Lee, K. H. (2010) The determinants of private tutoring participation and attendant expenditures in Korea, *Asia Pacific Education Review*, 11, 159–168.

Kim, J.-H. & Chang, J. (2010) Do governmental regulations for cram schools decrease the number of hours students spend on private tutoring?, *KEDI Journal of Educational Policy*, 7, 3–21.

Kim, J.-H. & Park, D. (2010) The determinants of demand for private tutoring in South Korea, *Asia Pacific Education Review*, 11, 411–421.

Kirss, L. & Jokić, B. (2013) Individual pupil characteristics and the decisions concerning private tutoring use, in: B. Jokić (Ed.) *NEPC comparative studies in education (vol. 2): Emerging from the shadow. A comparative qualitative exploration of private tutoring in Eurasia* (Zagreb, Network of Education Policy Centres), 163–207.

Kuan, P.-Y. (2011) Effects of cram schooling on mathematics performance: Evidence from junior high students in Taiwan, *Comparative Education Review*, 55, 342–368.

Kunter, M., Baumert, J., Blum, W., Klusmann, U., Krauss, S. & Neubrand, M. (Eds) (2013) *Mathematics teacher education (vol. 8): Cognitive activation in the mathematics classroom and professional competence of teachers* (New York, Springer).

Lee, C. J., Park, H.-J. & Lee, H. (2009) Shadow education systems, in: G. Sykes, B. L. Schneider, D. N. Plank & T. G. Ford (Eds) *Handbook of education policy research* (New York, Routledge), 901–919.

Lee, C. J., Lee, H. & Jang, H.-M. (2010) The history of policy responses to shadow education in South Korea: Implications for the next cycle of policy responses, *Asia Pacific Education Review*, 11, 97–108.

Lohmar, B. & Eckhardt, T. (2015) *The education system in the Federal Republic of Germany 2013/14*. Available online at: www.kmk.org/fileadmin/Dateien/pdf/Eurydice/Bildungswesen-engl-pdfs/dossier_en_ebook.pdf

Lüdtke, O., Marsh, H. W., Robitzsch, A., Trautwein, U., Asparoukhov, T. & Muthén, B. (2008) The multilevel latent covariate model: A new, more reliable approach to group-level effects in contextual studies, *Psychological Methods*, 13, 203–229.

Lüdtke, O., Robitzsch, A., Trautwein, U. & Kunter, M. (2009) Assessing the impact of learning environments: How to use student ratings of classroom characteristics in multilevel modeling, *Contemporary Educational Psychology*, 34, 120–131.

Luplow, N. & Schneider, T. (2014) Nutzung und Effektivität privat bezahlter Nachhilfe im Primarbereich [Social selectivity and effectiveness of private tutoring among elementary school children in Germany], *Zeitschrift für Soziologie*, 43, 31–49.

Moroni, S., Dumont, H. & Trautwein, U. (2016) Keine Hausaufgaben ohne Streit? Eine empirische Untersuchung zu Prädikturen von Streit wegen Hausaufgaben [No homework without conflict? An empirical study on predictors of conflict over homework], *Psychologie in Erziehung und Unterricht*, 63(2), 107–121.

Mullis, I. V. S., Martin, M. O., Gonzalez, E. J. & Kennedy, A. M. (2003) *PIRLS 2001 international report* (Chestnut Hill, MA, Boston College).

Muthén, B. O. & Muthén, L. K. (1998–2014) *Mplus Version 7.3* [Computer software] (Los Angeles CA, Muthén & Muthén).

Park, H., Buchmann, C., Choi, J. & Merry, J. J. (2016) Learning beyond the school walls: Trends and implications, *Annual Review of Sociology*, 42, 231–252.

Pellegrini, M., Lake, C., Inns, A. & Slavin, R. E. (2018) *Effective programs in elementary mathematics: A best-evidence synthesis*. Available online at: www.bestevidence.org/math elem/ elem_math_2018.htm (accessed 28 March 2019).

Rasch, G. (1960) *Probabilistic models for some intelligence and attainment tests* (Copenhagen, Danmarks paedagogiske Institut).
Raudenbush, S. W. & Bryk, A. S. (2002) *Hierarchical linear models: Applications and data analysis methods* (2nd edn) (Newbury Park, CA, Sage).

Reynolds, D., Sammons, P., de Fraine, B., van Damme, J., Townsend, T., Teddlie, C. *et al.* (2014) Educational effectiveness research (EER): A state-of-the-art review, *School Effectiveness and School Improvement*, 25, 197–230.

Rudolph, M. (2002) *Nachhilfe – gekaufte Bildung?* [Private tutoring – education bought?] (Bad Heilbrunn, Klinkhardt).

Slavin, R. E., Lake, C., Davis, S. & Madden, N. A. (2011) Effective programs for struggling readers: A best-evidence synthesis, *Educational Research Review*, 6(1), 1–26.

Smyth, E. (2008) The more, the better? Intensity of involvement in private tuition and examination performance, *Educational Research and Evaluation*, 14, 465–476.

Souvignier, E., Trenk-Hinterberger, I., Adam-Schwebe, S. & Gold, A. (2008) *FLVT 5–6. Frankfurter Leseverständnistest für 5. und 6. Klassen* [Frankfurt reading comprehension test for grade 5 and 6] (Göttingen, Hogrefe).

Tansel, A. & Bircan, F. (2006) Demand for education in Turkey: A tobit analysis of private tutoring expenditures, *Economics of Education Review*, 25, 303–313.

Trautwein, U., Lüdtke, O., Marsh, H. W., Köller, O. & Baumert, J. (2006) Tracking, grading, and student motivation: Using group composition and status to predict self-concept and interest in ninth-grade mathematics, *Journal of Educational Psychology*, 98, 788–806.

Vincent, C. & Maxwell, C. (2014) Parenting priorities and pressures. Furthering understanding of ‘concerted cultivation,’ *Discourse: Studies in the Cultural Politics of Education*, 37(2), 269–281.

Wigfield, A. & Eccles, J. S. (2000) Expectancy–value theory of achievement motivation, *Contemporary Educational Psychology*, 25, 68–81.

Wu, M. L., Adams, R. J., Wilson, M. R. & Haldane, S. (2007) *ACER ConQuest Version 2.0* [Computer software] (Camberwell, ACER Press).

**SUPPORTING INFORMATION**

Additional Supporting Information may be found in the online version of this article:

**Appendix S1.** A multilevel study of predictors of private tutoring attendance: The role of individual learning support in the classroom