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Compensation or accentuation? How parents from different social backgrounds decide to support their children

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Abstract

Previous research has shown that parents respond to differences in their children's potential by providing them with different levels of support, and that such support allocation decisions are shaped by socioeconomic status (SES). We extend this observation to the assumption, raised in research on parental compensation and social mobility, that not only the allocation, but also the form of support provided is socially stratified. Specifically, we investigate whether socioeconomically advantaged parents use mechanisms that do not rely directly on cognitive enhancement. Drawing on data from three consecutive waves of the German TwinLife study (N=962), we use twin fixed-effects models to examine how parents respond to their children having different grades. We investigate parental support strategies, including help with schoolwork and school-related communication, encouragement and explicitly formulated expectations, and extracurricular cognitive stimulation. Our findings suggest that high-SES parents tend to compensate for their children's poor performance by helping them with schoolwork, fostering communication, and formulating academic expectations and encouragement. In contrast, we found no evidence that parents in either high- or low-SES families respond to differences in their children's school performance by providing them with extracurricular cognitive stimulation.

Keywords: compensatory parenting, social stratification, school grades, twin fixed-effects, discordant parental support

Introduction

Within-family inequality driven by parents' unequal treatment of their children is receiving increasing attention in the social sciences (Conley 2011). In particular, the tendency of parents to provide their children with varying levels of support in response to differences in their perceived potential has been widely investigated (Akresh et al. 2012; Fan and Porter 2020; Frijters et al. 2013; Grätz and Torche 2016). Despite the assumption that parents are morally obliged to invest equally in their children (Becker and Tomes 1976:S152), in reality, parents often treat their children differently. Parents may favor one of their children for a variety of reasons (Jensen et al. 2013:440). In particular, parents may strategically support certain children more than others based on their perceived developmental potential. The literature discusses two opposing strategies. On the one hand, parents may reject equal parenting in favor of providing the more promising of their children with more support. Even if parents' goal is to maximize total returns from all offspring, they may consider it more efficient to invest more in their children who are expected to have higher returns than to invest equally in all their children (Conley 2008:185–86). This strategy is called accentuation. On the other hand, parents may seek to reduce inequality within the family by providing more support to their less promising children, which is called compensation (Behrman, Pollak, and Taubman 1982; Griliches 1979).

This within-family perspective has been largely neglected in social inequality research, even though differences between siblings account for a considerable share of overall educational and occupational inequality (Grätz et al. 2021). Related to the much more common focus on inequalities between families is the question of how the parental decision to accentuate or compensate depends on parental socioeconomic resources. Generally, most authors assume that advantaged parents can afford to compensate for their comparatively less gifted children through increased investment, while disadvantaged parents, under pressure to make cost-benefit trade-offs, are more likely to focus on the children they perceive as having more potential (Conley 2008; Hsin 2012; Restrepo 2016). In both cases, the class-specific allocation of support within the family can shape the opportunity structure of intergenerational mobility. In the first case, the tendency of socioeconomically advantaged families to adopt a compensatory support strategy can help to explain how they prevent their less promising children from experiencing downward mobility (see Bernardi 2014). In the second case, the tendency of socioeconomically disadvantaged families to use a strategy of accentuation can help to explain why opportunities for upward mobility are more limited in

the lower social classes. Much of the existing research on parents' strategic considerations in the allocation of support focuses on children's potential in terms of their cognitive ability (Akresh et al. 2012; Fan and Porter 2020; Frijters et al. 2013; Gil-Hernández 2019; Grätz and Torche 2016). Thus, scholarly interest in parental strategies has been largely limited to examining the extent to which parents seek to promote the cognitive development of their children by, for example, engaging in activities with their children or orchestrating extracurricular activities that are intended to stimulate their children's cognitive ability.

In this research, children's school grades have been less studied. School grades lead to educational qualifications, and are thus crucial factors in the system of the stratification of educational opportunities. This is particularly true in the German context, where school grades are based less on standardized test scores than on teachers' overall evaluations (Dian and Triventi 2021). In this study, we examine how parents respond to differences in their children's school grades in Germany. This indicator differs from cognitive ability in that a strategy to improve cognitive ability is only one way to influence school grades. Other strategies include strengthening children's motivation, helping them with homework, providing tutoring, or influencing teachers. All of this can be done without or in addition to focusing on cognitive ability.

The within-family design provides excellent opportunities to effectively control for unobserved heterogeneity, thereby strengthening the causal robustness of observational analyses (Behrman 2016). Drawing on research on social mobility (Breen and Goldthorpe 1997) and compensatory parental behavior (Bernardi 2014), we are guided by the question of whether the motivation to avoid downward mobility among high socioeconomic status (SES) families outweighs the motivation of low-SES families to move up the social ladder. Although largely ignored in previous research, the question of what particular strategies high-SES parents use to compensate for their children's low educational performance is important. Suggestions that these parents are less concerned with increasing their children's cognitive abilities through stimulation, and are more concerned with providing motivational support, have been raised in the literature (Bernardi 2012; Saunders 2010), but have not yet been tested empirically.

Using data from the German TwinLife study (Diewald et al. 2022), we apply a longitudinal twin fixed-effects design to examine how parents respond to their children's school grades, focusing on three different support strategies: support through help with schoolwork and school-related communication, support through encouragement and formulated expectations, and support

through extracurricular cognitive stimulation. This approach can deepen our understanding of how the responses of high-SES parents may differ from those of their low-SES counterparts, and of how the within-family perspective may be applied in the future to examine processes of social stratification between families.

Theoretical background

Parental support allocation stratified by SES

Education plays an essential role in sociological research on inequality and social mobility. On the one hand, education provides children with legitimate opportunities to climb the social ladder (Nielsen and Roos 2015). It allows low-SES families to apply their cognitive and other skills to demonstrate their ability to occupy higher positions than those of their parents (Saunders 2010). On the other hand, education helps higher-class children to reproduce their social status and minimize their risk of downward mobility (Bernardi 2012). It is important to distinguish between educational attainment and educational achievement in the sense of school performance (see Van De Werfhorst and Hofstede 2007). In the German context, grades are crucial for attaining formal school-leaving qualifications. In Germany, unlike in other contexts, school grades are not determined by standardized tests alone, but also by exams and an overall assessment of the student's performance by the teachers (Westphal, Vock, and Kretschmann 2021). In these assessments, student behavior in the classroom also plays a role, which can, in turn, be influenced by parents, and is based on class-specific cultural capital (Lareau 2002). Parents support their offspring to improve their educational performance and the impact of this has been widely studied (see Barger et al. 2019; Boonk et al. 2018).

Due to unequally distributed resources, parents have different ways of supporting their children to improve their school performance. Parents may strategically focus on supporting a particular child to increase that child's educational achievement. Evidence that parents respond differently to their children depending on each child's potential is well-documented in the literature. Several studies have found differences in the educational outcomes of siblings as measured by grades and test scores (Conley, Pfeiffer, and Velez 2007; Duncan, Boisjoly, and Harris 2001; Nicoletti and Rabe 2013), as well as differences between siblings in the levels of parental support they receive (Ayalew 2005; Grätz, Lang, and Diewald 2021; Grätz and Torche 2016).

Some of the literature on discordant parental support allocation has examined whether parents' decisions to provide more support to their more or less promising children depend on their SES. Given that improved educational achievement leads to higher educational attainment, such decisions may lead to opportunities for low-SES children to move up to higher strata, and for high-SES children to maintain the high status of their family of origin. According to relative risk aversion theory (Breen and Goldthorpe 1997), the motivation among low-SES parents to help their children move up tends to be less strong than the motivation to prevent their downward mobility among high-SES parents. This could, in turn, influence parental decisions about how to allocate support to their children. Among low-SES families, the assumption is that the more promising children will receive more support. Upward mobility may be desirable, but it is not a necessity. However, the costs of supporting their weaker children are comparatively higher. Thus, for low-SES parents, allocating their limited resources to their more promising children may be the most efficient way to achieve positive returns on their investments (Becker and Tomes 1976).

For high-SES families, the motivation to help their children maintain high status is strong, even if the children are less gifted and less motivated. Moreover, these families may have the resources to devote more attention to their lower-performing children when allocating support. At the same time, these families have sufficient economic and cultural resources to ensure that the better-performing children receive the minimum support necessary to maintain their success (Conley 2008; Restrepo 2016). Accordingly, high-SES families can compensate for the poor school performance of one or more of their children, thereby ensuring that all of their children achieve the desired level of educational attainment. This is consistent with the compensatory advantage literature, which shows that prior disadvantages have a smaller impact on educational attainment for children from high-SES families than for their low-SES counterparts (see Bernardi 2014). This could help to explain the phenomenon of low downward mobility among high-SES families (for the German context, see Dräger 2022). However, at least for children's cognitive ability, the use of this compensation strategy is not always confirmed, as there is evidence that advantaged parents provide more cognitive stimulation to children with higher ability, perhaps because these parents, most of whom live in a cognitively demanding environment, "find it easier, more pleasant, or more rewarding to interact with the child with higher ability" (Grätz and Torche 2016:1901).

Thus, these approaches to resource-dependent support allocation assume that parents evaluate how much potential their children have, and then, depending on their SES, either seek to enhance

the abilities of their more promising children or to compensate for the deficiencies of their children with less potential. We identify two shortcomings in the research. First, most studies have focused on children's potential by using intelligence (Akresh et al. 2012; Fan and Porter 2020; Frijters et al. 2013; Gil-Hernández 2019; Grätz and Torche 2016) or birth weight as an indicator of potential (Abufhele, Behrman, and Bravo 2017; Datar, Kilburn, and Loughran 2010; Del Bono, Ermisch, and Francesconi 2012; Hsin 2012; Lynch and Brooks 2013; Restrepo 2016; Yi et al. 2015). To the best of our knowledge, children's potential based on their school grades, which is a crucial indicator of future educational attainment, especially in Germany, has not been previously studied. The closest such indicator that has been studied is standardized test scores (Bernardi and Valdés 2021), but, as we mentioned above, school grades are subject to different preconditions. The focus on cognitive ability leads to the second shortcoming: namely, that the forms of parental support that have been examined in previous research are largely limited to parental cognitive stimulation (Abufhele et al. 2017; Lynch and Brooks 2013; Restrepo 2016). However, this does not take into account evidence in the literature suggesting that high-SES parents in particular support their children in many ways that go beyond direct skill enhancement (see Saunders 2010). Therefore, in the following section, we look at the various forms of support parents provide.

Parental support strategies

A question that has received little attention in previous empirical research is whether *how* parents support their children differs depending on their SES, especially when their goal is to reduce the influence of their children's low school performance on their future educational achievement and attainment. Overall, we focus on the question of whether high-SES parents use specific support instruments that go beyond seeking to strengthen their children's initial endowments to preserve their opportunities to obtain certain educational qualifications. This is related to previous research findings showing that support for children with stronger cognitive abilities is greater in high-SES groups (Grätz and Torche 2016), and to studies that do not consider parental SES (Frijters et al. 2013; Lynch and Brooks 2013), and thus contradict the assumption that compensatory behavior can mainly be observed among high-SES parents. These results suggest that high-SES parents may have little ambition to provide cognitive support to their less endowed children, and that they often pursue the goal of status maintenance through other support strategies.

Parental support is typically conceptualized as a multidimensional construct (Wang and Sheikh-Khalil 2014), with the most common distinction being between *school-based* and *home-based*

strategies (Barger et al. 2019). School-based strategies primarily refer to communication and interaction between parents and teachers or school administrators, as well as parental activities at school, such as volunteering at school, participating in school programs and events, or serving on parent-teacher advisory boards (Boonk et al. 2018:18; Karbach et al. 2013:44; Perkins et al. 2016:740). Home-based strategies refer to school-related activities that parents do directly with their children. Since school grades in Germany are not only determined by standardized tests, but also include other forms of student engagement, such as homework (see Dettmers et al. 2010), we focus on home-based support strategies. In countries where homework plays a subordinate role and parents therefore have less influence on this aspect of school performance, school-based strategies may be more effective. Especially for high-SES parents, involvement in the school and having direct interactions with teachers – or even making donations to the school – could act as social closure processes that enable them to secure advantages for their children.

Enhancing children's ability

In our study, we focus on two main categories of parental involvement that are observed among parents in Germany. First, parents may seek to increase their children's chances improving their school performance by fostering their children's initial cognitive abilities. Thus, the parents may try to help their children acquire the cognitive skills they need for educational achievement with *stimulation of cognitive ability*. This is not a class-specific form of support. Nevertheless, highly educated parents may have greater knowledge about the effective use of cognitively stimulating activities, and therefore achieve better results. This is consistent with the primary effects of social origin as formulated by Boudon (1974). It is important to note, however, that the forms of cognitive stimulation commonly studied in research do not require socioeconomic resources, but primarily parental effort and ability.

Results of previous research on parents' skill-enhancing support behavior have been mixed. Not considering SES, Abufhele et al. (2017) found that in Chile, parental efforts to provide their children with stimulating extracurricular activities do not vary based on their children's birth weight. Frijters et al. (2013) found that, regardless of their SES, parents in the US tend to focus on providing support in the form of cognitive stimulation for children with higher cognitive ability. Not considering SES, Lynch and Brooks (2013) showed that parents in the US focus on children with higher birth weight when distributing support in the form of cognitive stimulation. Fan and Porter (2020) observed that in Ethiopia, high-SES parents focus their cognitive stimulation

investments on children with lower cognitive ability, while low-SES parents do not allocate their support depending on their children's cognitive ability. Grätz and Torche (2016) reported that in the US, high-SES parents allocate more support in the form of cognitive stimulation to children with higher cognitive ability, while low-SES parents do not allocate their cognitive stimulation support according to their children's cognitive ability. Focusing on children's potential operationalized by birth weight, Restrepo (2016) showed that high-SES parents in the US tend to address endowment differences by providing more cognitive stimulation support to children with lower birth weight, while low-SES parents tend allocate more cognitive stimulation support to children with higher birth weight.

Other forms of parental involvement

Turning to the second category of parental involvement, some parents do not seek to enhance their children's existing skills to maximize their cognitive endowments, but instead focus on helping their children develop skills and motivations that are not directly linked to cognitive ability. There is widespread agreement in the social mobility literature that high-SES parents in particular are motivated to push their children to the highest levels of educational attainment, even when children lack cognitive ability. Both Boudon's (1974) secondary effects of social origin theory and the relative risk aversion theory (Breen and Goldthorpe 1997) address motivational differences by SES when school performance is held constant. However, both approaches rely on parental decisions regarding school tracking and continuation or dropout, whereas we focus on the goal of improving children's grades.

We identify two specific forms of support for children's school achievement that go beyond strengthening their cognitive skills. The first involves parent-child interactions that focus on engagement with school-related issues. Commonly used indicators of these strategies include communication with the child about school, guiding learning activities at home, helping with and monitoring homework, and creating a supportive learning environment at home (Boonk et al. 2018). We conceptualize this form of support as *school-related help and communication.* This issue has been addressed in a number of studies. For the US context, Hsin (2012) showed that high-SES parents tend to provide more such support to children with low birth weight, while low-SES parents tend to provide more support to children with higher birth weight. Yi et al. (2015) showed that parents in China provide more support to children with higher birth weight through educational investments. While including financial investments in children's school-related activities in

the category of school-related help, Cabrera-Hernandez et al. (2016) showed that high-SES parents in Mexico make more monetary investments in children with low birth weight, while low-SES parents do not vary their monetary investments depending on the children's birth weight. Furthermore, comparing 36 countries, Huang (2020) showed that high-SES parents invested more in fee-paying tutoring than their low-SES counterparts for children with low cognitive skills.

The second form of support is based on the concept of academic socialization (Hill 2001), which encompasses communication of parental expectations and aspirations for educational outcomes and the importance parents place on education, as well as encouragement to achieve educational goals (Perkins et al. 2016). To some extent, this is related to the idea that high-SES parents instill a "sense of entitlement" (Lareau 2002:749) in their children. We therefore conceptualize this type of support as *academic encouragement and expectations*. For the German context, Bittman (2022) showed that parental expectations and aspirations explain 24% of the variance in secondary school choice. There are two studies that examined this form of parental support as a SES-specific strategy of compensation: Bernardi and Valdes (2021) showed that high-SES parents tend to compensate for their children's low school performance by reinforcing their educational aspirations and expectations; and Forster (2021) showed that when children perform poorly in school, high-SES parents maintain their high expectations for their children's ultimate educational attainment, while low-SES parents strongly adjust their expectations downward.

Hypotheses

To the best of our knowledge, our study is the first that compares three types of support and examines the allocation of each type of support in response to children's school grades in the German context. We expect to find that compensatory support, i.e., a special focus on children with lower grades, is mainly provided by high-SES parents (Hypothesis 1). In examining three specific support forms, high-SES parents may have other ways of compensating for their children's poor academic performance than trying to help them improve their cognitive abilities. Therefore, we expect that high-SES families are more likely to engage in helping and communicating about school-related matters (Hypothesis 1a) and in motivational support through the formulation of academic encouragement and expectations (Hypothesis 1b). Accordingly, we expect to find that high-SES families allocate more cognitive stimulation to their better-performing children, or that they provide it independent of their children's prior academic achievement (Hypothesis 1c).

Since we expect that the strategies of engaging in compensation through help and communication and providing motivational support through encouragement and expectation are mainly employed by high-SES families, we assume that low-SES parents do not provide these forms of support based on their children's school performance (Hypothesis 2a). In the case of cognitive stimulation, we expect to find that low-SES parents try to enhance the success of their more promising children in terms of school grades, both because the cost of compensation is high, and because they wish to maximize the potential of their more promising children (Hypothesis 2b).

Data, Method, Variables

Data

We base our analyses on data from the first three waves of the *TwinLife* study (Diewald et al. 2022), which is the first panel study of twin families in Germany based on a national probability sample (Lang and Kottwitz 2017), including both monozygotic (MZ) and dizygotic (DZ) twins and their families. Our sample is restricted to participants of the second cohort (born in 2003/2004), who were, on average, 11 years old at the time of the first wave. In the third wave, in which parental support is measured, these children were around 13 years old. In Germany, students of that age are usually already enrolled in secondary education, but their educational trajectories can still change substantially. To ensure comparability, only twin pairs in which both twins were living in the same household and were enrolled in the same school track are kept in our sample. After these restrictions are applied, our sample consists of 962 twins nested in 481 twin pairs (208 MZ/273 DZ).

The extent to which estimates derived from twin data can be generalized to non-twin families should be considered. It is possible that twin families have some special characteristics that strongly influence within-family processes (Mönkediek et al. 2020). Previous research has shown that, on average, parents of twins are older than parents of non-twins and twins have lower birth weights than non-twins (Grätz and Torche 2016:1891–92). Nevertheless, there is sufficient evidence from previous research to suggest that findings based on twin samples regarding both educational achievement (De Zeeuw et al. 2012) and parental support (Mönkediek et al. 2020) can be generalized to non-twin families.

Method

Analyzing within-twin-pair differences using twin fixed-effects (Behrman 2016) controls for shared environmental and some genetic confounding. The panel design of the TwinLife data

allows us to use waves from three consecutive years to conduct our analyses longitudinally. Our dependent variables of parental support are based on the third wave, and the main independent variable of educational achievement, operationalized by school grades, is from the second wave. To account for reverse causality, we additionally control for parental support in the first wave, as shown in Figure 1.

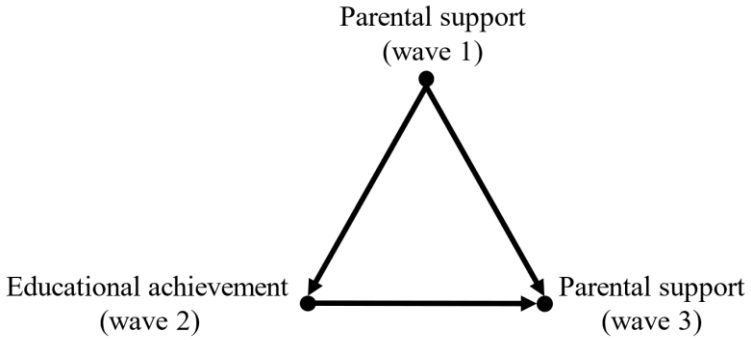

Figure 1: Directed acyclic graph of the research design

We use a twin fixed-effects model shown in the formula below. Two individual twins *i* are each nested in a twin pair *j*. The individual values of parental support are represented by Y_{ij}, the values of educational achievement as predictors by A_{ij}, and the values of the covariate of parental support surveyed in wave 1 by X_{ij}. The error term at the twin pair level is represented by u_j and the individual error term by e_{ij}. All variables are demeaned through the fixed-effects transformation, so that the error term u_j drops out of the model. Accordingly, the design controls for all unobserved heterogeneity that does not vary within twin pairs. Moderation of the effects of parental SES is modeled by stratifying the sample into a high- and a low-SES group. In addition to the models stratified by SES, we estimate models with all participants and include interactions of the predictor variables and the covariates with SES to test whether the effects differ significantly between status groups. All models include clustered standard errors at the twin pair level.

$$\left(Y_{ij} - \bar{Y}_{ij}\right) = b_0 + b_1\left(A_{ij} - \bar{A}_{ij}\right) + b_2\left(X_{ij} - \bar{X}_{ij}\right) + \left(u_j - \bar{u}_j\right) + (e_{ij} - \bar{e}_{ij})$$

Using the twin fixed-effects approach, we follow much of the research on within-family differences in general (see Grätz, Lang, et al. 2021) and compensation and accentuation patterns in particular (see Gil-Hernández 2019).

Variables

Educational achievement

We operationalize educational achievement by children's math grades, following previous research (Baier and Van Winkle 2021; Mönkediek 2020). In the German school system, grades range from 1 (excellent) to 6 (non-satisfactory). To improve the interpretability of the scores in our analyses, we have reversed the grade scales so that higher values correspond to better grades. The survey of school grades in the TwinLife study is based on the twins' most recent report cards (Mattheus et al. 2017). In cases in which the most recent certificates are not available, grades have been obtained from parental reports. Because Germany has a school system that is stratified into different tracks, we keep only those twin pairs in our sample in which both children attended the same track to ensure that we are estimating the parents' reactions to their children's grade differences without bias due to school track differences. For the analyses, the reversed grades are z-standardized.

Parental support

We assume that the parental support categories are latent constructs that influence the participants' responses on certain indicators. To include these constructs, eight indicators have been selected, each of which is expected to fall into one of the three support categories of academic expectations and encouragement, school-related help and communication, or extracurricular cognitive and intellectual stimulation. All indicators are assessed on a scale from 1 (not correct at all/not at all) to 5 (fully correct/almost daily). All items are z-standardized for the analyses. Descriptive statistics of the unstandardized indicators in waves 1 and 3 are shown in Table 1.

Table 1: Indicators of latent support variables

	Wave 1			Wave 3		
	Mean	SD	N	Mean	SD	N
"When I study for an exam, I know exactly how much effort my parents expect me to put in."	3.929	1.014	1255	3.952	0.924	1266
"If I don't understand something in class, I can talk to my parents about it."	4.181	0.946	1279	4.229	0.801	1273
"My parents encourage me to ask questions in class if I don't understand something."	3.604	1.325	1253	3.834	1.185	1266
"My parents comfort me and help me when I'm struggling at school."	4.554	0.797	1288	4.386	0.829	1272
"My parents tell me that I can ask them if I want to know about something in more detail."	4.560	0.799	1287	4.417	0.805	1274
"My parents are interested in what I have learned at school."	4.341	0.884	1271	4.200	0.852	1228

"How often have your parents or other members of your family taken part in the following activities with you during the last four weeks? – Singing and making music."	1.934	1.296	1259	1.892	1.223	1036
"How often have your parents or other members of your family taken part in the following activities with you during the last four weeks? – Reading books or talking about books."	2.441	1.444	1261	2.102	1.232	1090

Source: TwinLife (waves 1 and 3)

As some parents may have been uncomfortable admitting that their support or time spent with their children is unequally allocated, all indicators are based on statements made by the twins. To explore whether distinct latent factors of the support variables can be derived from these indicators, we have applied a principal component analysis (PCA). From three latent factors suggested by PCA, the latent score variables for the three parental support categories are created using a confirmatory factor analysis (CFA). The variance of the factors is fixed at 1, and missing values are considered using the Full Information Maximum Likelihood estimation method. The fit indices of the first wave scores are 0.990 for the Comparative Fit Index (CFI), 0.022 for the Root Mean Square Error of Approximation (RMSEA), and 0.020 for the Standardized Root Mean Square Residual (SRMR). When applying the CFA based on the wave 3 variables, similar values are obtained (CFI: 0.991; RMSEA: 0.022; SRMR: 0.021). For the analyses, we z-standardize all three support variables.

Socioeconomic status

To stratify the sample by parental SES, we use two different indicators of parental SES to strengthen the robustness of our results. On the one hand, we rely on a dummy variable that distinguishes between parents with and without tertiary education. We use the highest ISCED score of a parent within a family as the determining factor. This approach is often used to distinguish between two SES groups, and has been previously applied in studies that examined the unequal allocation of parental support (Gil-Hernández 2019; Grätz and Torche 2016). On the other hand, we have divided our sample according to the highest level of parental occupation. We define high-SES families as those in which at least one parent belongs to one of the upper two classes of the Erikson-Goldthorpe-Portocarero (EGP) class scheme (Erikson and Goldthorpe 1992). This distinction has also already been used in previous research on discordant parenting and within-twin-pair differences (Grätz, Lang, et al. 2021).

Results

Table 2 shows that the analytical sample using ISCED values as SES indicators includes a total of 962 individual twins, of whom 756 belong to the high-SES group and 206 to the low-SES group. The sample using EGP values as SES indicators includes 916 individual twins, of whom 520 are classified as high-SES and 442 as low-SES. In both samples, the proportions of female twins and MZ twins are slightly higher in low-SES families than in high-SES families. The math grade scores indicate that high-SES children have better grades than their low-SES counterparts when SES is operationalized by either ISCED or EGP. Regarding support scores, the variation between SES groups shows higher support through encouragement and expectation in low-SES children, and higher support through help and communication as well as extracurricular cognitive stimulation in high-SES children. This suggests that there are no substantial differences between high- and low-SES twins depending on how SES is operationalized. The distributions of the variables also show no profound differences, and all variables are largely normally distributed (see Appendix).

Table 2: Descriptive statistics of the key variables

	ISCED				EGP			
	High		Low		High		Low	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Female	0.508	0.500	0.534	0.500	0.512	0.500	0.516	0.500
Monozygotic	0.415	0.493	0.495	0.501	0.419	0.494	0.448	0.498
Math grade (reversed)	0.085	0.955	-0.301	1.077	0.088	0.983	-0.098	0.999
Support scores								
Encouragement and expectation (wave 1)	-0.023	0.970	0.174	1.038	-0.020	1.012	0.066	0.957
Encouragement and expectation (wave 3)	-0.032	1.020	0.139	0.944	-0.016	1.025	0.028	0.984
Help and communication (wave 1)	0.101	0.912	0.016	0.933	0.106	0.945	0.055	0.882
Help and communication (wave 3)	0.094	0.916	-0.060	1.061	0.116	0.938	-0.004	0.962
Extracurricular cognitive stimulation (wave 1)	0.109	1.007	-0.287	0.900	0.111	0.988	-0.079	1.000
Extracurricular cognitive stimulation (wave 3)	0.080	1.038	-0.182	0.895	0.150	1.013	-0.123	0.997
N (individuals)	756		206		520		442	

Notes: All variables except zygosity and sex are z-standardized
Source: TwinLife (waves 1-3)

First, we examine the effect of children's school performance on parental support using the full sample of 962 individual twins. We then stratify the sample into high- and low-SES families for

both SES operationalizations. In all models, we control for the respective parental support behavior in wave 1, prior to the measurement of math grades in wave 2. Compensating support behavior would be represented by a negative effect of math grades, while accentuating support behavior would be represented by a positive effect of math grades. Unstratified models with interaction terms by parental SES as measured by ISCED and EGP are presented in the Appendix.

Table 3 shows the effect of math grades on parental support through encouragement and expectation. In Model 1, which includes the full sample, we examine whether parents respond to differences in their children's educational achievement levels through compensating or accentuating behavior. It shows a positive significant effect of children's math grades on parental support through encouragement and expectation, indicating compensating parental behavior. A 1 standard deviation increase in math grades leads to a 0.135 standard deviation decline in parental support through encouragement and expectation. Models 2-5 in Table 3 provide information on whether this effect depends on parental SES. These results show that high-SES parents are more supportive of the child with lower grades, while low-SES parents do not respond to differences in math grades by discordant support through encouragement and expectation. This finding is consistent across both indicators of parental SES. For high-SES parents as measured by education (ISCED), a 1 standard deviation increase in math grades within twin pairs leads to a -0.151 standard deviation decline in parental support through encouragement and expectation. For high-SES parents as measured by occupation (EGP), this math grade increase leads to a 0.170 standard deviation decline in support. Both effects are significant. Among low-SES parents (ISCED and EGP), weak negative effects are observed, neither of which is significant. Thus, the results show significant negative effects for high-SES families, as measured by both ISCED and EGP, and insignificant effects for low-SES families. Comparing the full models in Table 3 with the base models without controlling for parental support in wave 1 (see Appendix) shows that the added wave 1 support variable has only a weak impact on the effect of math grades on support through encouragement and expectation in wave 3.

The non-stratified models with interaction effects (see Appendix) show that the effects of math grades on parental support through encouragement and expectation do not differ significantly between the status groups.

Table 3: Twin fixed-effect estimates of the effect of math grades on parental support through encouragement and expectation

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.135*	-0.151*	-0.098	-0.170*	-0.087
	(0.057)	(0.059)	(0.148)	(0.073)	(0.090)
Encouragement and expectation (wave 1)	0.130**	0.156**	0.046	0.180**	0.068
	(0.044)	(0.048)	(0.102)	(0.059)	(0.064)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
$^{\dagger}p<0.10$, $*p<0.05$, $**p<0.01$

The effects of math grades on parental support through help and communication are shown in Table 4. Model 1 examines across the entire sample whether and how parents respond to educational inequalities between their children by providing or withholding this type of support. Here, math grades have a negative effect, indicating that parents engage in compensatory support behavior through help and communication. A 1 standard deviation increase in math grades leads to a 0.100 standard deviation decline in parental support through help and communication within twin pairs. However, this effect has only borderline statistical significance. In Models 2 to 5, we again see a pattern in which high-SES families tend to distribute their support to compensate, and in which the support behavior of low-SES families does not depend on the differences in the twins' math grades. The effect of high-SES parents is significant only in Model 2, which includes parental education as a SES indicator. This effect shows that a 1 standard deviation increase in math grades leads to a 0.120 decline in parental support through help and communication. However, the high-SES effect size in Model 4 that includes occupation as a SES indicator is similarly high, at -0.131, while the effect sizes in low-SES families are smaller and insignificant. Thus, we again observe a pattern in which parents in high-SES families try to provide compensatory support, while parents in low-SES families do not respond to educational inequality between their children by providing support through help and communication. As in the examination of parental responsiveness through encouragement and expectation, the comparisons of the base models without controlling for support in wave 1 (see Appendix) with the models in Table 4 do not reveal substantial differences.

The non-stratified models with interaction effects (see Appendix) show no significant moderation effect of SES (as measured by ISCED or EGP) on the effects of math grades on parental support through help and communication.

Table 4: Twin fixed-effect estimates of the effect of math grades on parental support through school-related help and communication

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.100†	-0.120*	-0.033	-0.131†	-0.061
	(0.055)	(0.059)	(0.129)	(0.075)	(0.081)
Help and communication (wave 1)	0.121**	0.141**	0.042	0.123*	0.116
	(0.045)	(0.049)	(0.111)	(0.053)	(0.077)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
†p<0.10, *p<0.05, **p<0.01

The effects of math grades on parental support through extracurricular cognitive stimulation are shown in Table 5. Model 1 shows the effect over the full sample. This effect is relatively weak and insignificant, indicating that this type of parental support does not depend on differences in children's grades. Models 2-5 show the estimates stratified by parental SES. In contrast to the previous results, here, the pattern of parental responses to within-family educational inequality is less clear. The effect of math grades is not significant in any of the models. However, when operationalizing SES by parental education, the pattern of compensatory behavior in advantaged families shown in the previous results can be found here as well. Accordingly, Model 2 shows that a 1 standard deviation increase in math grades leads to a 0.108 standard deviation decrease in extracurricular cognitive stimulation. By contrast, in low-SES families, no effect of math grades on parental support through extracurricular cognitive stimulation is observed. However, when SES is operationalized by EGP, there are no substantial differences between high- and low-SES families. Thus, the results for this form of parental support behavior are less consistent than for the previously examined support types. Comparisons of the results with models that do not control for support in wave 1 do not reveal substantial differences.

The non-stratified models with interaction terms included (see Appendix) do not show significant interaction effects between math grades and either type of SES on parental support through extracurricular cognitive stimulation.

Table 5: Twin fixed-effect estimates of math grades on parental support through extracurricular cognitive stimulation

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.080	-0.108	0.005	-0.074	-0.091
	(0.059)	(0.069)	(0.112)	(0.072)	(0.094)
Extracurricular cognitive stimulation (wave 1)	0.035	0.031	0.039	-0.022	0.112
	(0.054)	(0.058)	(0.127)	(0.072)	(0.078)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
$^{\dagger}p<0.10$, $*p<0.05$, $**p<0.01$

The coefficients of the math grade effects on the different types of support shown in Tables 3 to 5 are summarized in Figure 3. A consistent pattern emerges whereby in response to educational inequality between their children, high-SES parents tend to provide compensatory support in the form of support that is not directly related to cognitive stimulation, but rather to educational motivation and parental involvement in the child's school performance. Meanwhile, low-SES parents do not appear to vary their supportive behavior based on their children's prior school performance.

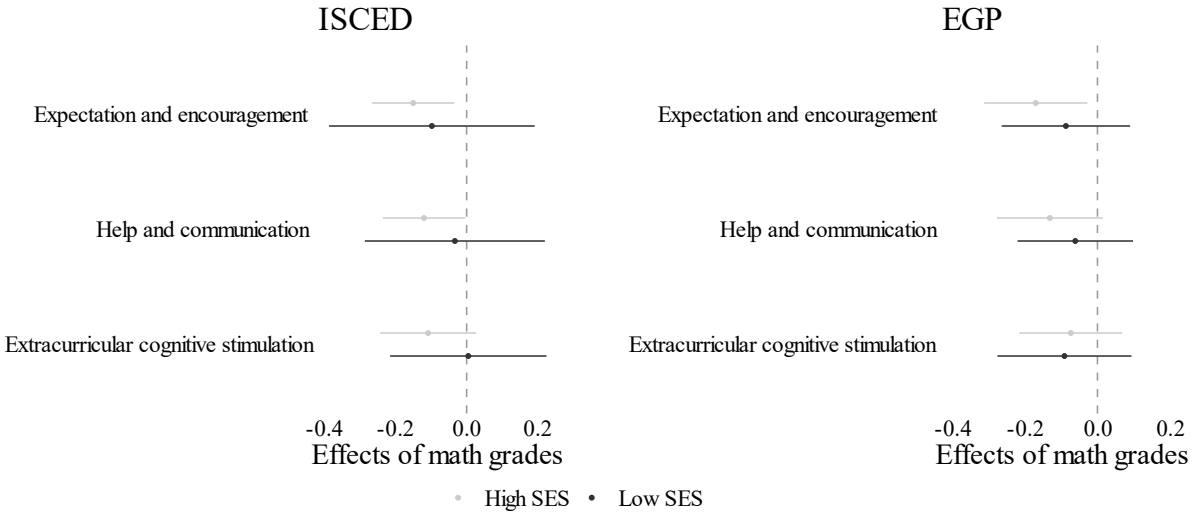

Figure 2: Twin fixed-effects coefficients of math grades on parental support

Discussion

Parents' use of SES-specific strategies to compensate for their children's low school performance or enhance the performance of their already successful children has received increasing attention in social inequality research, as they may contribute to the risk of downward mobility

and to opportunities for upward mobility. This study sought to examine not only whether parents of different social classes use different strategies, but also what specific strategies these parents employ. Unlike higher intelligence, higher school grades can be achieved through several pathways, some of which are more available to high- than to low-SES parents. We examined a broader range of options that have not been sufficiently addressed in previous research. Guided by the existing literature on within-family support allocation (see Conley 2008), parental compensatory behavior (see Bernardi 2014), and social mobility (see Breen and Goldthorpe 1997), we expected to find that providing compensatory support for children with low prior school performance to improve their future educational achievement would be more common among high- than low-SES families (Hypothesis 1). Specifically, we expected these parents to provide compensatory support mainly in the form of school-related help and communication (Hypothesis 1a) and the formulation of academic expectations and encouragement (Hypothesis 1b), rather than through cognitive stimulation (Hypothesis 1c). For low-SES families, we expected that their support through non-cognitively stimulating activities would not depend on their children's prior school performance (Hypothesis 2a), and that they would be more likely to engage in cognitive stimulation if a child showed more educational potential (Hypothesis 2b). To test these hypotheses, we used a longitudinal twin fixed-effects approach based on three waves of the German TwinLife study.

Our results support most of these hypotheses and yield three main findings. First, in high-SES families, parents respond to their children having poorer school grades by providing them with higher levels of support through help and communication as well as expectations and encouragement. Although the effect for help and communication is insignificant when EGP is considered as a SES indicator, the negative effects and the significant estimates found for all other models of these forms of support among high-SES families clearly indicate that Hypotheses 1a and 1b can be confirmed.

Second, the results for cognitive stimulation in high-SES families are mixed. Although the estimates for both SES indicators are insignificant, the point estimate for ISCED as a SES indicator is negative, indicating compensatory parental behavior. For EGP as a SES indicator, the coefficient is also negative, but very small. Overall, our analyses show much less robust results with respect to parental responses through cognitive stimulation than for the other forms of support, which is why Hypothesis 1c is not confirmed.

Third, for the group of low-SES families, whether measured by ISCED or by EGP, no significant effects are found for any of the three forms of support. Almost all effects are negative, but so small that interpretation in terms of compensatory behavior would not be useful. Rather, the results indicate that low-SES parents do not appear to base any of their support allocation on their children's earlier school performance. This is consistent with Hypothesis 2a with respect to the non-cognitive support forms, but contradicts Hypothesis 2b.

While previous research has primarily examined SES-specific support allocation in response to cognitive ability and birth weight, our study is the first to examine parental responses to children's school grades. Our finding that high-SES parents provide compensatory support for less promising children is consistent with research showing evidence of these mechanisms among high-SES parents in response to their children's cognitive abilities and birth weight (Hsin 2012; Hussain 2010; Restrepo 2016). We do not detect these mechanisms for cognitive stimulation in either high- or low-SES families. However, our finding that high-SES parents provide compensatory support through help and communication as well as through expectations and encouragement supports our assumption that not only the allocation of support, but also the type of support provided is socially stratified. This observation is consistent with previous research, which suggests that only high-SES families use educational expectations and aspirations as a means of preventing their children from experiencing downward mobility (Bernardi and Valdés 2021; Forster 2021). Our finding that only high-SES families provide support for low-performing children through direct help and communication about school-related topics further underscores the point that these parents tend to rely on instruments other than cognitive skill enhancement to improve their children's school performance.

Going beyond the scope of our study, two limitations merit consideration. First, we look only at the mechanisms through which parents respond to their children's school performance, and we do not examine how parental support actually affects the children's school grades and educational attainment. Thus, whether or not the lower downward mobility in high-SES families can actually explained by parental support remains an open question. Since there is already some evidence on the development of school success and the retention of less gifted children in higher forms of schooling (Bernardi 2012; Bernardi and Triventi 2020; Bernardi and Valdés 2021; Gil-Hernández 2019; Heiskala, Erola, and Kilpi-Jakonen 2021; Herbaut 2021), we decided that for this study, we would build on this state of research and focus on *how* parents try to compensate for their children's

poor school performance. Second, our analytical design controls for a large amount of unobserved heterogeneity, including some genetic confounding and possible environmental confounding, by restricting the sample to one cohort and to twin pairs in the same school type, controlling for prior school performance, and including two different SES measures. The data used here could also be used to assess the relative contributions of genetic variation and environmental sources of unequal parenting. Genetic variation can influence parenting in several ways: e.g., through genetic similarity between parents and children, genetic sources of school performance (Breinholt and Conley 2023), and shared genetic sources of school performance and parenting behavior. The interplay between genetic and environmental sources of parenting behavior could be addressed by quantitative genetic approaches, such as the Purcell model (Purcell 2002) or the ACE beta-model (Kohler, Behrman, and Schnittker 2011).

Our findings provide an incentive for future research to examine compensation and accentuation as unequal forms of support for siblings by including all relevant types of support, especially those that are unequally allocated across SES. Of particular interest is the distinction between support that enhances legitimate criteria for educational success, such as motivation, cognitive ability, or skills like conscientiousness, versus support that is not directed at enhancing these legitimate sources of success, but is instead designed to help children regardless of whether they have those characteristics; in other words, that functions as a social closure mechanism. Overall, our results suggest that high-SES parents in particular seem to be aware of the ways in which they can influence their children, even without the help of school-based support. Thus, the main finding of our study is that high-SES parents use both motivational support and direct help with schoolwork to compensate for their children's prior poor school performance. Whether other forms of support, like positively influencing teachers' evaluations or providing financial support for the school, act as social closure mechanisms could not be studied here due to missing information.

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Compensation or accentuation? How parents from different social backgrounds decide to support their children

Online Appendix

Table S1: Factor loadings derived from PCA

	Factor loadings (wave 1)			Factor loadings (wave 3)		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
"When I study for an exam, I know exactly how much effort my parents expect me to put in."	0.675			0.802		
"If I don't understand something in class, I can talk to my parents about it."	0.736			0.792		
"My parents encourage me to ask questions in class if I don't understand something."	0.613			0.658		
"My parents comfort me and help me when I'm struggling at school."		0.747			0.764	
"My parents tell me that I can ask them if I want to know about something in more detail."		0.671			0.771	
"My parents are interested in what I have learned at school."		0.717			0.757	
"How often have your parents or other members of your family taken part in the following activities with you during the last four weeks? – Singing and making music."			0.829			0.841
"How often have your parents or other members of your family taken part in the following activities with you during the last four weeks? – Reading books or talking about books."			0.809			0.763

Source: TwinLife (waves 1 and 3); version 6.0.0.

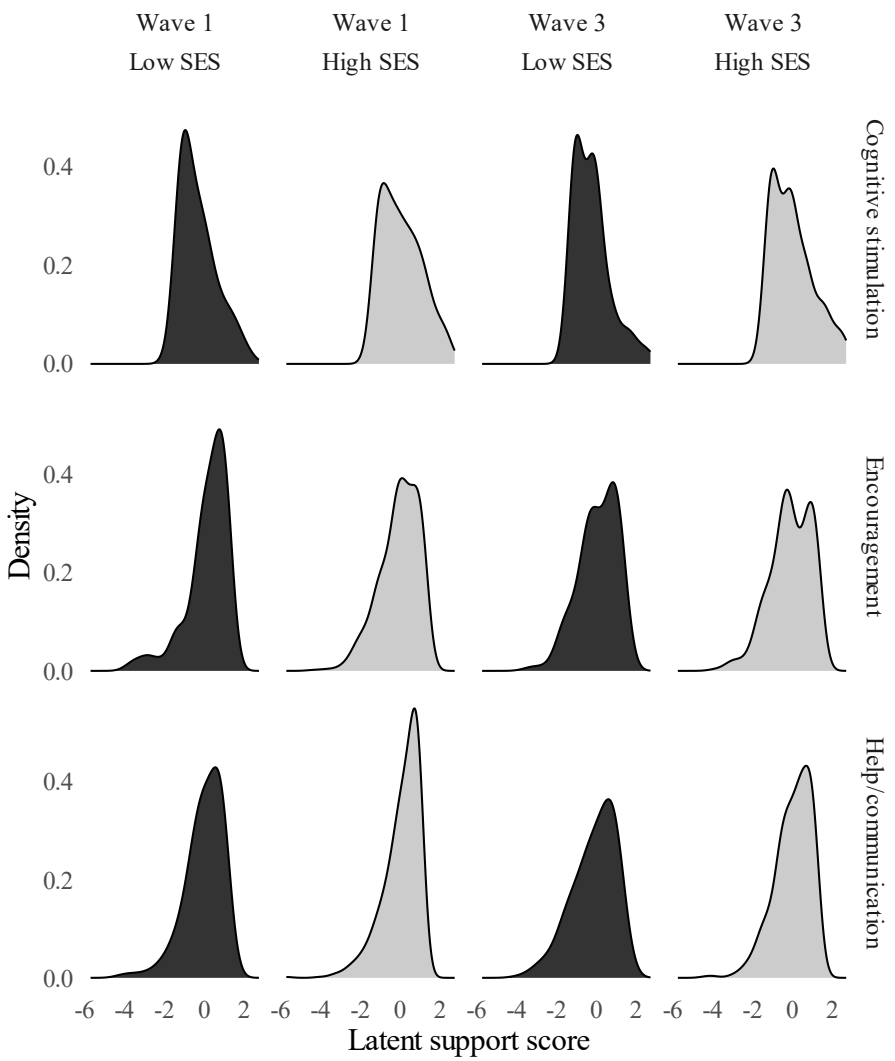

Figure S1: Density distributions of latent support variables stratified by SES (ISCED)

Source: Twinlife (waves 1 and 3), version 6.0.0.

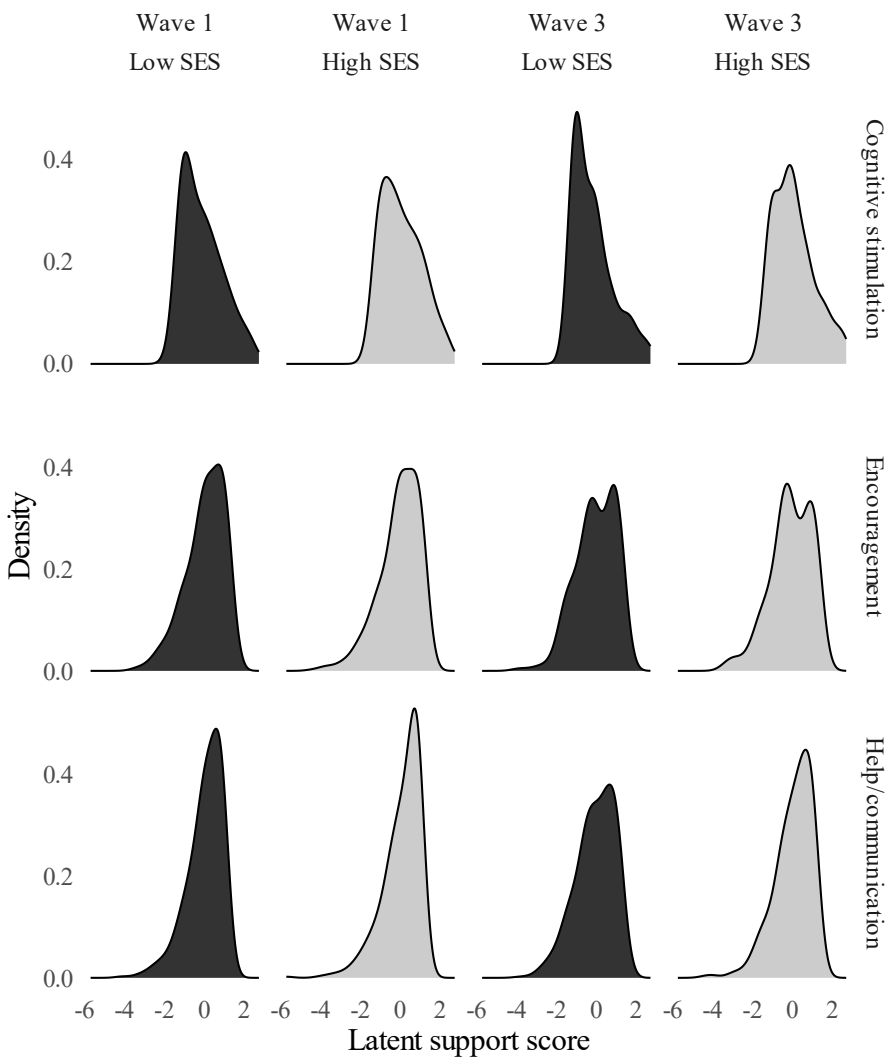

Figure S2: Density distributions of latent support variables stratified by SES (EGP)

Source: Twinlife (waves 1 and 3), version 6.0.0.

Table S2: Twin fixed-effect estimates of the effect of math grades on parental support through encouragement and expectation without covariates

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.139*	-0.151*	-0.103	-0.183*	-0.086
	(0.057)	(0.060)	(0.145)	(0.073)	(0.090)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
†p<0.10, *p<0.05, **p<0.01

Table S3: Twin fixed-effect estimates of the effect of math grades on parental support through school-related help and communication without covariates

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.096†	-0.118*	-0.030	-0.132†	-0.054
	(0.055)	(0.059)	(0.129)	(0.073)	(0.083)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
†p<0.10, *p<0.05, **p<0.01

Table S4: Twin fixed-effect estimates of math grades on parental support through extracurricular cognitive stimulation without covariates

		ISCED		EGP	
	All	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)
Math grade (wave 2)	-0.079	-0.108	0.010	-0.075	-0.084
	(0.059)	(0.069)	(0.110)	(0.072)	(0.098)
N (individuals)	962	756	206	520	442
N (twin pairs)	481	378	103	260	221

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
†p<0.10, *p<0.05, **p<0.01

Table S5: Twin fixed-effect estimates of math grades on parental support with interaction terms

	Encouragement and expectation		Help and communication		Extracurricular cognitive stimulation	
	ISCED	EGP	ISCED	EGP	ISCED	EGP
	(1)	(2)	(3)	(4)	(5)	(6)
Math grade (wave 2)	-0.098	-0.087	-0.033	-0.061	0.005	-0.091
	(0.147)	(0.090)	(0.128)	(0.081)	(0.112)	(0.094)
Encouragement and expectation (wave 1)	0.046	0.068				
	(0.102)	(0.064)				
Help and communication (wave 1)			0.042	0.116		
			(0.110)	(0.077)		
Cognitive stimulation (wave 1)					0.039	0.112
					(0.126)	(0.077)
Encouragement and expectation (wave 1) × High SES	0.111	0.133				
	(0.112)	(0.087)				
Help and communication (wave 1) × High SES			0.099	0.008		
			(0.120)	(0.093)		
Cognitive stimulation (wave 1) × High SES					-0.008	-0.134
					(0.139)	(0.106)
Math grade (wave 2) × High SES	-0.053	-0.083	-0.087	-0.070	-0.113	0.017
	(0.158)	(0.116)	(0.142)	(0.110)	(0.131)	(0.119)
N (individuals)	962	962	962	962	962	962
N (twin pairs)	481	481	481	481	481	481

Notes: Standard errors clustered at the twin pair level in parentheses; all variables are z-standardized
Source: TwinLife (waves 1-3), version 6.0.0
$^{\dagger}p<0.10$, $^{*}p<0.05$, $^{**}p<0.01$