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Full-Time Ability Grouping of Gifted Students: Impacts on Social Self-Concept and School-Related Attitudes

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Abstract

Positive socioemotional outcomes and developments represent important educational goals. Full-time ability grouping of gifted students has been criticized for potentially detrimental socioemotional effects. Therefore, in the present longitudinal study, we investigated whether or not social self-concepts and school-related attitudes and beliefs are affected by full-time ability grouping of the gifted. Students in regular classes and students in special classes for the gifted were paralleled for cognitive ability, sex, socioeconomic status, and school. By doing so, we studied 99 "statistical twins" (N = 198) from the beginning of fifth grade to the middle of sixth grade. Data were analyzed through repeated-measures multivariate analysis of covariance (within-subject factor: time; between-subject factors: class type—gifted vs. regular—and cognitive ability as covariate). Cognitive ability had hardly any effect on the variables under study. Attending a gifted class had initially positive effects on students' social self-concept of acceptance but no effects on social self-concept of assertiveness. Moreover, children in gifted classes exhibited more interest in school and reported better student–teacher relationships than their counterparts in regular classes.

Keywords

social and/or emotional development and adjustment, social self-concept, school-related attitudes, ability grouping, longitudinal study, secondary, age/developmental stage

The costs and gains of ability grouping have been a hotly debated issue among educational researchers for several decades (e.g., Oakes, 1985). Neihart (2007) defines ability grouping as "any arrangement that attempts to place students with similar levels of ability in instructional groups" (p. 333). There are various forms of ability grouping (e.g., full-time vs. part-time or within-class vs. between-class), which are associated with different outcomes for gifted students (e.g., Rogers, 2007). Academic achievement and learning progress depend on the fit of the learning environment to the specific abilities and needs of the individual learner. The most prominent characteristic of the gifted is their high cognitive ability. Research has shown that gifted students crucially require adequate academic challenge and peers of equal intellectual ability to prevent motivational, emotional, and social problems (Robinson, 2002). The academic benefits of ability grouping for gifted students are well documented (e.g., Kulik & Kulik, 1982, 1992; Rogers, 2007; Shields, 2002). Nevertheless, a number of objections have been raised to the provision of special educational programs for the gifted, especially with respect to full-time ability grouping in special classes. One of the major concerns is that full-time ability grouping has potentially negative impacts on students' social and emotional development (e.g., Colangelo, Assouline, & Gross, 2004; Neihart, 2007). Some students feel isolated, suffer under pressure to perform (e.g., Hertzog, 2003), and most students experience a decrease in academic self-concept due to reference group effects (i.e., the Big-Fish-Little-Pond Effect; Seaton, Marsh, & Craven, 2009; for studies on ability grouping of the gifted see Preckel & Brüll, 2010, or Preckel, Goetz, & Frenzel, 2010).

Positive social and emotional development represents an important educational goal in itself. In gifted education, the process of transforming abilities into exceptional achievements requires psychosocial strength of students (Subotnik, Olszewski-Kubilius, & Worrell, 2012). In general, a positive socioemotional development is related to cognitive outcomes in various ways (Driscoll, 2005): Subjective well-being influences motivation, which, in turn, affects effort, participation, and subsequent achievement (e.g., Goodenow, 1993a, 1993b). A positive classroom climate is related to better grades, more positive attitudes toward school, higher degrees of participation, and less disruptive behavior (Eder, 1996; Goodenow, 1993b). Positive relationships within a class are

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associated with positive attitudes toward school and academic achievement (e.g., Patrick, Anderman, & Ryan, 2002).

However, the effects of ability grouping of gifted children on socioemotional variables, such as well-being, classroom climate, peer relations, and school-related attitudes, have not been researched thoroughly (Delcourt, Cornell, & Goldberg, 2007; Neihart, 2007). Our study aimed to fill this gap by investigating students' social self-concept and school-related attitudes and beliefs in special classes for the gifted (i.e., full-time ability grouping) as compared with students in regular classes. In detail, we focused on students' social self-concept of acceptance, their social self-concept of assertiveness, their interest in school, the student–teacher relationship, and social tension experienced in class.

One problem in research on ability grouping of the gifted is that many studies are simply correlational and descriptive, and they do not use study designs with adequate control groups (Neihart, 2007). That is, few studies have compared gifted children in classes with full-time ability grouping (gifted classes) with their counterparts in regular classes. Yet this aspect appears crucial to evaluate whether the potential benefits of gifted classes outweigh their potential drawbacks. Therefore, in our study, we compared children attending either gifted classes with full-time ability grouping or regular classes while matching both groups for possibly confounding factors like cognitive ability, sex, attended school, and socioeconomic status. Furthermore, our study had a longitudinal design, enabling us to investigate group differences and their development over time.

Theory and Current Research

One highly controversial issue in the field of gifted research and education is the definition of giftedness (Dai, Swanson, & Cheng, 2011). Many different concepts and models of giftedness exist, but it is widely agreed upon that cognitive ability (either as general intellectual ability or as specific abilities) is a necessary—albeit not always sufficient—indicator of intellectual giftedness (Subotnik et al., 2012). According to multidimensional conceptions of giftedness as presented by Gagné's (1985) Differentiated Model of Giftedness and Talent or by the Munich Model of Giftedness and Talent (Heller, Perleth, & Lim, 2005), the potential for extraordinary achievement (as one prominent understanding of giftedness) relies not only on natural abilities or high cognitive ability but also on intrapersonal characteristics, such as motivational variables or prior skills and knowledge. Therefore, and of note for our study, admission to gifted classes as an environment to foster excellence is usually based on multiple criteria. Besides cognitive abilities, motivational variables and prior achievements, such as school grades or competition results, are usually taken into account. However, cognitive ability is established as one of the best or even the single best predictor of academic achievement, and it has also been found to be positively related to socioemotional adjustment (e.g., Kuncel, Hezlett, & Ones, 2004; Neisser et al., 1996). To distinguish the effects of ability grouping from those of cognitive ability, we therefore separately analyzed how these two factors—attending a regular or special class and cognitive ability—are related to our outcome variables.

In the following section, we provide an overview for the constructs under study of social self-concept and school-related attitudes. After defining each construct, we first describe how social self-concept and school-related attitudes are related to cognitive ability before discussing how their development is possibly influenced by ability grouping.

Social Self-Concept

Social self-concept is one dimension of the multidimensional and hierarchically structured self-concept (Shavelson, Hubner, & Stanton, 1976). Social self-concept refers to a person's self-perceptions of his or her social acceptance by others as well as his or her social skills with respect to social interactions with others (Berndt & Burgy, 1996; Byrne & Shavelson, 1996). It evolves through the assessment of one's own social behavior within social contexts (Markus & Wurf, 1987).

Bryne and Shavelson (1996) provided evidence that social self-concept is multidimensional and hierarchically ordered. The global social self-concept consists of two major facets: social self-concept relating to the family (with the subdimensions of siblings and parents) and social self-concept referring to the school environment (with the subdimensions of classmates and teachers).

With respect to content (not context) of social self-concept, most studies focused exclusively on people's perception of their social acceptance, whereas appraisals of social skills like assertiveness have largely been neglected. To investigate social self-concept more comprehensively, it is important to take both aspects into account. Therefore, the present study focuses on social self-concept of acceptance and social self-concept of assertiveness. Within the school setting, the social self-concept of acceptance describes the sense of affiliation, social acceptance, and integration into a peer group (Goodenow, 1993a, 1993b). The social self-concept of assertiveness constitutes faith in one's ability to assert oneself. In the school environment, children compete with one another on a daily basis, making subjective assertiveness a subject of considerable interest (e.g., Egan & Perry, 1998). Trautwein (2003) demonstrated a better empirical fit for models that differentiated between social acceptance and assertiveness than for models with one overall social self-concept factor. The latent correlations between the two content factors were substantial ($r > .74$). Thus, social acceptance and assertiveness are separable but positively correlated as people who perceive themselves as more accepted by others are also more likely to perceive themselves as more socially skilled (Berndt & Burgy, 1996).

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Social self-concept and (high) cognitive ability. The evidence regarding the relationship of cognitive ability and social self-concept is ambiguous and contradictory (Van Boxtel & Mönks, 1992). On one hand, there is a long history of the stereotype that gifted children are typically outcasts, who are not accepted by their peers (Baudson & Preckel, 2013). On the other hand, there is evidence that the high cognitive abilities of gifted children are accompanied by a keen sense for social situations that is beneficial in social interactions. In sum, empirical findings suggest no systematic differences (e.g., Richards, Encel, & Shute, 2003) or even a slightly higher social self-concept in gifted or highly intelligent children when compared with children of average ability (e.g., Dauber & Benbow, 1990; Lee, Olszweski-Kubilius, & Thomson, 2012; Neihart, 1999; Rost & Czeschlik, 1994; Van Boxtel & Mönks, 1992).

Influence of ability grouping in gifted classes on social self-concept. Some researchers assume that being in a gifted class with more intellectually similar peers leads to an increase in social self-concept, because students are treated with less stigma and thus experience fewer social difficulties (Cross, 2005; Gross, 2000). Especially for adolescents, there is some evidence that academic engagement and success (which are positively related to cognitive ability) are devalued by peers and negatively associated with students' standing in the peer group (e.g., Hopmeyer Gorman, Kim, & Schimmelbusch, 2002). Academic competence is more strongly related to peer acceptance in elementary school than in middle or high school (Vannatta, Gartsein, Zeller, & Noll, 2009). This might also be a reason why high ability students start to select each other as friends as they enter early adolescence (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010). Eder (1989) demonstrated that adolescent students in regular classes who were categorized as high achievers based on their teachers' assessments and their own academic self-concept scores perceived their classroom climate in a more positive light and tended to rate their social self-concept of acceptance more positively when the number of intellectually comparable classmates was higher (three to seven). Therefore, for a positive development of social self-concept of acceptance, it seems to be crucial that gifted adolescents have the possibility to connect with peers of equal ability—which, among other things, is offered by means of ability grouping.

However, findings for an influence of ability grouping in gifted classes on students' social self-concept are heterogeneous. For example, Cross and Swiatek (2009) investigated 1,039 high school students attending a special boarding school for the gifted for a period of 2 years. The authors found that gifted children experienced more social acceptance and achieved a higher level of psychosocial adjustment if the school setting provided contact with peers of equal intellectual ability. Bain and Bell (2004) compared 26 gifted children who took part in special gifted programs with 67 high achievers who had not been identified as gifted. Children who had been labeled as gifted exhibited a significantly higher social self-concept of acceptance than the control group. In contrast, Delcourt et al. (2007) did not detect any differences in perceived social acceptance between elementary schoolchildren in gifted classes (n = 290), high achievers without any special treatment (n = 50), and students in regular classes (n = 120). Shields (2002) also found that ability grouping was not associated with perceived peer relations of older students (Grade 5 and Grade 8). In addition, research from outside the field of gifted education in various countries (e.g., Australia, Germany, and Slovenia) also indicated that ability grouping does not affect social self-concept in any particular way (e.g., Marsh, 1984; Pečjak, Levpušček, Peklaj, & Žagar, 2003; Pekrun, 1985; Trautwein, Köller, & Kämmerer, 2002).

Preckel and Brüll (2008) investigated the development of social self-concept of acceptance from the end of elementary school (fourth grade) through the first half-year of secondary school (fifth grade in Germany) for students who either attended regular classes or classes for the gifted. They observed an initial positive development of gifted children in gifted classes. However, this effect did not persist; instead, there was a decline in social self-concept of acceptance later on. Children in gifted classes (n = 46) perceived their social self-concept of acceptance in an even more negative light than their nongifted peers in regular classes (n = 156) in the middle of the fifth grade. Makel, Lee, Olszweski-Kubilius, and Puttalaz (2012) who studied participants of summer programs for the gifted also found evidence for unstable effects. The social self-concept of acceptance before the program was significantly lower than at the end of the program, but it decreased again 6 months after the children returned to their regular classrooms.

In sum, findings on the relation between social self-concept of gifted students and ability grouping revealed inconsistent results, which might practically be explained by different age groups under investigation, different criteria for gifted identification, or different fostering options (e.g., summer schools vs. full-time grouping).

School-Related Attitudes and Beliefs

In the present study, we investigated interest in school, student–teacher relationships, and social tension in class. These are central aspects of the construct of classroom climate and are often investigated under this heading. We adopted the approach of Eder (1996), who views "school and classroom climate as a specific configuration of key elements of educational relations between teachers and students as well as peer relations and educationally important attitudes and behavior dispositions of teachers and students within the particular learning environment" (p. 26, translated by the authors).

Strictly speaking, the term *classroom climate* implies a data analysis on a higher-level unit (class) by aggregating individual perceptions. However, it can also be operationalized at the

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individual level (psychological climate) as most of the existing studies relevant to the present investigation did. We therefore chose to refer to school-related attitudes and beliefs instead of classroom climate.

School-related attitudes and beliefs and (high) cognitive ability. In a large-scale study of 10th-grade high school students ($N = 12{,}630$), Roznowski, Reith, and Hong (2000) compared children based on their general intelligence. Students above the 95th percentile showed more interest in school and had a higher level of satisfaction with their education than less intelligent students. Academic achievement, which is strongly influenced by cognitive ability, is positively associated with interest in school as well as with student–teacher relationships. Eder (1989) found that high achievers reported a higher level of satisfaction with their instruction at school, had more positive school-related attitudes, and experienced better relationships with their teachers when compared with average-ability students. Children who are academically successful showed more interest in school (McCoach & Siegle, 2001; Weiner, 1992). This finding is in agreement with the person–object approach to interest (e.g., Krapp, 1999), which states that people tend to be more engaged in activities in which they feel competent. In general, high cognitive abilities increase the probability of success in school, which in turn induces positive emotions (such as joy or pride) and positive appraisals (higher locus of control and self-efficacy; Goetz et al., 2004; Pekrun, Goetz, Titz, & Perry, 2002).

Influence of ability grouping in gifted classes on school-related attitudes and beliefs. A review of studies on socioemotional effects of gifted ability grouping by Neihart (2007) revealed mixed findings. Only very few studies have analyzed school-related attitudes and beliefs of gifted children in gifted classes as compared with gifted children in regular classes. According to Zeidner and Schleyer (1999a), gifted classes provide gifted children not only an intellectually challenging environment but also an intellectually homogenous and thus more positive and supportive classroom atmosphere. The authors examined different aspects of school-related attitudes and beliefs in gifted children in Israel: The 321 children in gifted classes had a more positive perception of the classroom atmosphere, a better appraisal of their relationship with their teachers, and a higher overall sense of school satisfaction than the 661 equally talented children in regular classes. Students in gifted classes also experienced their classes as more cohesive; they reported fewer discipline problems as well as less social tension in class. Shields (2002) compared fifth- and eighth-grade gifted students in homogenous and heterogeneous classrooms. Gifted students in homogeneous classrooms reported more development of their career interests, while there were no significant differences in enjoyment of school or involvement in school activities. Adams-Byers, Whitsell, and Moon (2004) asked 44 students enrolled in a summer program for gifted and talented youth to compare homogenous and mixed-ability grouping with respect to academic and social/emotional issues. Students mentioned motivation and challenge, teacher behavior, as well as a better understanding ("peers think alike") as advantages of homogenous grouping. Research from outside the field of gifted education is ambiguous as well. Some studies found beneficial effects of ability grouping on the well-being of the students and on the student–teacher relationships (De Fraine, Van Damme, & Onghena, 2002; Van Landeghem, Van Damme, Opdenakker, De Fraine, & Onghena, 2002), while other studies did not detect systematic differences (Ireson & Hallam, 2005). In sum, the knowledge base for effects of full-time ability grouping in gifted classes on school-related attitudes and beliefs is scarce, but indicates some positive effects. However, it is difficult to summarize results because the various studies investigated different age groups, used different criteria for gifted identification, implemented different programming options (e.g., summer schools vs. full-time grouping), or were conducted in different educational systems.

Of note, school-related attitudes and beliefs change over time. The vast majority of studies found these changes to be negative for motivation and interest (Anderman & Maehr, 1994; Eccles & Midgley, 1989), enjoyment of school and well-being in the school setting (Helmke, 1993), and enjoyment of mathematics (Goetz et al., 2004). According to the stage–environment fit theory of Eccles and Midgley (1989), an inferior fit between the needs of the students and the contextual conditions is responsible for this decrease. A case in point is the transition to secondary school, when stricter grading, more teacher-centered lessons, and less emotional support can severely impair the quality of the student–teacher relationship.

Study Aims and Hypotheses

The present study investigated social self-concept of acceptance, social self-concept of assertiveness, interest in school, student–teacher relationship, and social tension experienced in class of students in gifted classes and regular classes in the top track of the German three-tier secondary school system. By assessing students repeatedly (two or four times, depending on the outcome variable; see *Design*) within their first one and a half years in secondary school, we could investigate their development over time. Of note, ability grouping started with secondary school (fifth grade). That is, we investigated students in their first 18 months in either gifted or regular classes. We were mainly interested in the impact of ability grouping of gifted students. When comparing students in gifted classes and regular classes, we therefore controlled for possibly confounding factors like cognitive ability, sex, socioeconomic status, and school by matching students in both class types (gifted vs. regular) for these variables. Based on our extensive review of the literature, we investigated the following hypotheses:

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1. We expected that children in special classes for the gifted and their counterparts in regular classes exhibit different trajectories in the development of social self-concepts and school-related attitudes (interactions of class type and time):
   a) We expected to find an initial increase in social self-concept of acceptance and in social self-concept of assertiveness for students in gifted classes only. With respect to the development of social self-concept of acceptance and social self-concept of assertiveness beyond the beginning of fifth grade, data are very scarce. Thus, the issue was addressed in an explorative manner.
   b) For school-related attitudes, we expected a deterioration of interest in school and student–teacher relationship in the regular classes. Because of a better fit between the needs of the students and the contextual conditions, we expected no negative or even a positive development of these variables in gifted classes. Little is known about the development of social tension. Therefore, no hypothesis was formulated for this variable; instead, its development was investigated in an explorative manner.

There is evidence that cognitive ability is positively related to social self-concept and school related attitudes. Therefore, we not only matched students in both class types for cognitive ability (see Parallelization Procedure section) but also explored the relations between cognitive ability and social self-concepts (social self-concept of acceptance and social self-concept of assertiveness) or school related attitudes (interest in school, student–teacher relationship, and social tension), and controlled for cognitive ability when investigating our hypotheses.

Method

Parallelization Procedure

One of the most common points of criticism directed at studies in the field of giftedness research is the absence of adequate control groups (i.e., a priori differences among students are not taken into account). We applied statistical matching of the students in gifted classes and in regular classes according to the variables cognitive ability, sex, socioeconomic status, and school to reduce this methodological problem. By doing so, we were able to control some possibly confounding variables. The parallelization was accomplished by means of Euclidean distances within data sets that had been presorted according to sex and school attended. Within these subsamples, a Java program[1] was used to search for optimal matches. For each student in a gifted class, we selected a student from a regular class who was closest to her or him in terms of cognitive ability and socioeconomic status. In an iterative process, the sample size was decreased until the effect size d for the cognitive ability discrepancy between groups was assumed to be negligible ($d = 0.07$) and until there were no further significant differences between the groups regarding their socioeconomic status.[2]

Participants

Participants came from five schools located in two of Germany's federal states (Bavaria and Rhineland-Palatinate). These schools belonged to the top track of the German secondary school system (Gymnasium; starting with Grade 5 in these federal states), and all of them offered gifted classes (full-time ability grouping of gifted students) in addition to regular classes from Grade 5 onward. The schools employed similar multistage selection procedures for gifted classes: They required completion of an application form with general information on family and child (e.g., school career), previous school certificates, and the results of an intelligence test. All schools had school psychologists who administered IQ tests; a minimum IQ, for example, IQ 120, was required for admission to gifted classes. Finally, the selection process was completed by teacher observations of behavior during 1 or 2 days of probationary class. Applicants were selected in a conference among teachers, school psychologists, and school board members based on a partly compensatory strategy (i.e., very high achievements could partly compensate for an IQ below 120 and vice versa).

Within the special classes for the gifted, the standard curriculum was presented at a faster pace (acceleration) and more in depth (enrichment) than in the regular classes. In detail, the schools offered full-time schooling, bilingual lessons, a compacted curriculum, additional lessons in scientific subjects (e.g., computer sciences or experiments) and interdisciplinary projects. The final sample size consisted of 198 students from four successive cohorts (beginning with the school year 2005-2006).

The students in gifted classes were significantly younger than their counterparts in regular classes, $t(93) = -7.27$, $p < .01$, $d = -0.75$. This was because some of the students in the gifted classes took part in acceleration programs, such as skipping a grade or early entrance to school. Students in gifted classes had higher grade point averages, $t(92) = 2.07$, $p = .04$, $d = 0.21$. With respect to the socioeconomic status of the families, the Wilcoxon test for dependent samples showed no significant differences, $z = -1.22$, $p = .22$, $r = .12$. For further information on the children selected (matched sample), see Table 1. Table 1 also includes information on the overall sample for purposes of evaluation of the representativeness of the selected sample.

Design

Data collection took place in class. Trained research assistants administered the self-report questionnaires, while

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Table 1. Descriptive Statistics for the Matched Sample (N = 198) and the Overall Sample (N = 1033).

	Matched sample		Overall sample	
	Gifted classes (n = 99)	Regular classes (n = 99)	Gifted classes (n = 223)	Regular classes (n = 810)
Age[a] (years)				
M (*SD*)	10.13 (0.56)	10.55 (0.40)	10.22 (0.60)	10.55 (0.43)
Range	8.75-11.17	9.64-11.36	7.98-11.55	8.48-12.64
Gender, % female	45.45	45.45	39.01	48.89
Intelligence: *M* (*SD*)	117.89 (8.99)	117.29 (8.83)	121.27 (10.43)	108.62 (9.59)
Socioeconomic status[b], %				
• No school qualification	0.0	0.0	0.0	0.1
• Lower-track secondary school (Hauptschule)	1.0	0.0	0.4	1.4
• Middle-track secondary school (Realschule)	4.0	8.1	4.0	9.3
• Academic-track secondary school (Gymnasium)	15.2	10.1	9.4	6.2
• University degree	66.7	75.8	43.9	27.5
• Doctorate	13.1	6.1	10.3	2.5

[a]Age at the beginning of fifth grade. [b]The socioeconomic status of the parents was operationalized through the highest secondary school diploma obtained within a family. This information was taken directly from the self-reports of the parents or, in a small number of cases, was inferred a posteriori from the job descriptions provided by the children.

psychologists administered the cognitive ability tests. Students responded to the questionnaires four times: (1) within the first week of secondary school (fifth grade; questions referred to experiences in primary school), (2) after 1 month in secondary school, (3) in the middle of the fifth grade (after the mid-term report), and (4) in the middle of the sixth grade. Social self-concept was assessed all four times, whereas school-related attitudes and beliefs were only surveyed in the first and the third waves of measurement. Students' cognitive ability was assessed by a standardized, group-administered test up to 6 months after the start of fifth grade.

Variables and Measures

In this section, we address the variables we assessed and analyzed in the course of this study.

Social self-concepts. For the assessment of *social self-concept of acceptance* and *social self-concept of assertiveness*, we used three-item short scales of measures developed by Fend and Prester (1986). These short scales have been used in various national and international studies (Baumert et al., 1996; Trautwein, Köller, Baumert, 2004; Pekrun et al., 2002; Jonkmann, Trautwein, Lüdtke, 2009). For social self-concept of acceptance, we focused on social self-concept of acceptance as it relates to classmates. This facet of social self-concept has been found to be highly correlated with global social self-concept in the age group under study (r > .80; Byrne & Shavelson, 1996). Sample items are "In class, I sometimes feel like an outsider" (social self-concept of acceptance) and "Sometimes I don't say anything although I am right" (social self-concept of assertiveness).

Participants responded to the items on a 5-point rating scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. To ease interpretation in the present study, all items were inverted before analysis, such that higher numbers indicate better social self-concepts. Reliabilities (Cronbach's alpha) for all four waves of measurement were .74, .74, .86, and .74, respectively (N = 186/168/166/170) for the social self-concept of acceptance and were α = .56, .71, .74, and .67, respectively (N = 190/167/165/168) for the social self-concept of assertiveness.

School-related attitudes. School-related attitudes were assessed with a German translation of a self-report instrument developed by Zeidner and Schleyer (1999a, 1999b; see Larissafar, 2010). The 14 items covered the following domains: student–teacher relationship, social tension, and interest in school. The response format consisted of a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Student–teacher relationship was assessed with six items (e.g., "Teachers treat me with dignity"); the internal consistency was good (α = .86 and .78; N = 186/163). The other two scales consisted of four items each (e.g., social tension: "Students frequently put one another down"; interest in school: "I find school subjects interesting"). For the two waves of measurement, Cronbach's alpha for social tension was α = .70/.66 (N = 190/170) and for interest in school was α = .63/.75 (N = 189/170).

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Cognitive ability. We applied the KFT 4-12+R (Heller & Perleth, 2000; $M = 100$; $SD = 15$), which is a German adaptation of the Cognitive Abilities Test developed by Thorndike and Hagen (1971). In Germany, the KFT 4-12+R is one of the most frequently used cognitive ability tests in the research on giftedness and education. The KFT 4-12+R can be used to assess verbal, numerical, and figural reasoning as well as a composite score. Reasoning ability or the "capacity for processing power/formal logical thinking and judgment ability" (Carroll, 1993, p. 64) is established as a core construct of intelligence (Carroll, 1993; McGrew, 2005). The 90-minute short version of the test was administered in class using a paper-and-pencil format. The sample alpha was .93 for the composite score.

Data Analysis

Handling of missing data. Longitudinal studies are frequently confronted with the problem of missing values. In the present study, the number of cases with missing data for single items varied from 2.0% to 17.2% and could therefore be characterized as substantial. The nonsignificant Little's missing completely at random test, $\chi^2(1916) = 1942.03$, $p = .33$, indicated that the data were probably missing at random. Thus, list-wise deletion of cases would, at first glance, seem to be appropriate. However, this approach is only recommended if the variables contain missing data in fewer than 5% of all cases (Graham, Cumsille, & Elek-Fisk, 2003); it can lead to biased parameter estimates if data are not missing at random. Another potential drawback of list-wise deletion is the reduction of the sample size and the associated increase in measurement error. Because the number of cases with missing data exceeded 5% for several items, we decided to impute missing data using maximum likelihood estimation (expectation–maximization [EM] algorithm in the SPSS missing values option).

Analysis procedures. First of all, we conducted preliminary analyses to verify the representativeness of our gifted subsample for the overall sample and to test whether there were a priori differences between the children in gifted classes and those in regular classes. Furthermore, descriptive statistics for the social self-concepts, the school-related attitudes and beliefs, as well as intercorrelations of measures (see Appendix) were assessed. Correlations among the five dependent variables (social self-concept of acceptance, social self-concept of assertiveness, interest in school, student–teacher relationship, and social tension) were performed to examine the suitability of a multivariate analytic strategy. With only one exception, social self-concept of acceptance and social self-concept of assertiveness were significantly correlated at all waves of measurement. Likewise, all but one pair of the three facets of school-related attitudes was significantly correlated.

There are valuable modern approaches, such as growth curve modeling to analyze longitudinal data; however, linear modeling requires at least three time points, and for nonlinear growth trajectories, four or more points of measurement are needed (McCoach, Rambo, & Welsh, 2013). In addition, due to our strict parallelization procedure, the sample size did not allow growth curve modeling. Thus, more traditional multivariate analysis of covariances (MANCOVAs) were considered adequate statistical methods for social self-concepts and school-related attitudes. Data were analyzed separately for either social self-concepts or school-related attitudes and beliefs as dependent variables through repeated measures multivariate analysis of covariance (within-subject factor: time; between-subject factors: class type—gifted vs. regular—and cognitive ability as covariate). By this, mean level differences and changes over time could be examined. Univariate tests (analysis of covariance [ANCOVAs]) were conducted if multivariate results (using Wilk's criterion) were significant. Bonferroni correction was used to control for cumulative Type 1 error. Simple contrasts were only performed to follow up significant univariate results.

Because the main effect of time is changed by the introduction of a covariate, we followed the advice of Delaney and Maxwell (1981) not to use the raw scores of the covariate but used grand mean centered cognitive ability scores instead.

Analysis of covariance requires that several assumptions are met. First of all, the interactions of class type (independent variable) and cognitive ability (covariate) were tested separately for social self-concepts and school-related attitudes. The nonsignificant interactions (all ps $> .07$) indicated that the homogeneity of regression slopes was met. The reliability of the covariate ($\alpha = .93$) was also sufficient. In addition, the variances of the differences between all levels of the independent variable have to be equal. Mauchly's test for sphericity was used to test this assumption. For both social self-concepts, Mauchly's test for sphericity was significant; thus, Greenhouse-Geisser epsilon correction was implemented. Furthermore, multivariate normality and homogeneity of the variance–covariance matrices are required. These two assumptions were not fully met; however, the equal cell size and the sufficient sample size of the present study guarantee the robustness of the tests (Stevens, 2002; Tabachnick & Fidell, 2005). Finally, Levene's test confirmed the homogeneity of variance for all dependent variables.

Most studies that use repeated measures analysis of variance report partial eta-squares (η_p^2) as effect sizes. However, partial eta-squared values are dependent on the design of the study. Thus, we decided to use generalized eta-squared values (η_G^2) defined by Olejnik and Algina (2003) as these values can be compared across study designs. The magnitude of η_G^2 can be judged according to Cohen's guidelines for η^2

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Table 2. Means (Standard Deviations) for Social Self-Concept and School-Related Attitude Measures by Wave and Class Type (Gifted vs. Regular) for the Matched Sample (N = 198).

	Wave 1	Wave 2	Wave 3	Wave 4
Self-concept of acceptance	4.16 (0.89)	4.44 (0.67)	4.28 (0.81)	4.41 (0.70)
Gifted classes	4.04 (0.95)	4.50 (0.60)	4.23 (0.83)	4.36 (0.69)
Regular classes	4.27 (0.82)	4.37 (0.73)	4.33 (0.79)	4.47 (0.70)
Self-concept of assertiveness	3.65 (0.86)	3.85 (0.88)	3.73 (0.92)	3.90 (0.79)
Gifted classes	3.75 (0.89)	3.94 (0.82)	3.79 (0.94)	3.90 (0.80)
Regular classes	3.55 (0.82)	3.75 (0.92)	3.67 (0.90)	3.90 (0.78)
Interest in school	3.78 (0.73)	—	3.68 (0.73)	—
Gifted classes	3.73 (0.75)	—	3.85 (0.62)	—
Regular classes	3.84 (0.71)	—	3.50 (0.78)	—
Student–teacher relationship	3.95 (0.86)	—	3.74 (0.70)	—
Gifted classes	3.89 (0.95)	—	3.82 (0.63)	—
Regular classes	4.02 (0.77)	—	3.65 (0.76)	—
Social tension	2.37 (0.86)	—	2.21 (0.69)	—
Gifted classes	2.44 (0.87)	—	2.26 (0.65)	—
Regular classes	2.31 (0.84)	—	2.17 (0.74)	—

Note. Numbers 1 to 4 represent waves of measurement.

(Bakeman, 2005). Unfortunately, η^2_G cannot be used for the multivariate omnibus test, but it can only be computed for univariate analyses of variances (Bakeman, 2005). For the multivariate result, we therefore report partial eta-squared values η^2_p. It has to be taken into account that they cannot be compared across different studies, and thus the guidelines of Cohen (1988) do not apply. However, the actual effect size of the multivariate omnibus test is negligible, because the multivariate test mainly ensures the adequacy of univariate tests. For the univariate tests, we report generalized eta-squared values (η^2_G).

Results

Preliminary Analyses

Regarding our dependent variables, the t tests comparing the students in gifted classes with and without matches in a regular class revealed only one significant difference. In the second wave of measurement, social self-concept of assertiveness differed significantly in favor of the children in the matched sample, $t(180) = 2.17$, $p = .03$, $d = .32$.[3] All other variables did not differ (all ps > .10, $d_{max} = .23$), indicating the representativeness of our matched sample for the overall sample. When comparing students in the matched sample over class type (gifted vs. regular) in the first wave of measurement, we found no significant mean differences (all ps > .07, $d_{max} = .25$). Thus, a priori differences in dependent variables between the different class types could be excluded (as one precondition for attributing possible effects to class type; e.g., Rossi, Freeman, & Hofmann, 1988).

Table 2 shows the descriptive statistics for the dependent variables. Mean scores for social self-concept of acceptance, social self-concept of assertiveness, interest in school, and student–teacher relationship were quite high, whereas scores for social tension were relatively low.

Social Self-Concepts

The multivariate analysis indicated significant main effects of time, Wilks's $\Lambda = .78$, $F(6, 189) = 8.92$, $p < .01$, $\eta^2_p = .22$, and class type, Wilks's $\Lambda = .97$, $F(2, 193) = 3.30$, $p = .04$, $\eta^2_p = .03$, as well as a significant interaction of time and class type, Wilks's $\Lambda = .93$, $F(6, 189) = 2.44$, $p = .03$, $\eta^2_p = .07$, while statistically controlling for cognitive ability as covariate. The interaction implied that there were different developmental pathways for the social self-concepts of children within gifted classes and children within regular classes.

Furthermore, Wilks's lambda (.96) indicated that cognitive ability as covariate was significantly related to the combined dependent variables (social self-concept of acceptance and social self-concept of assertiveness), $F(2, 193) = 3.60$, $p = .03$, $\eta^2_p = .04$. Neither the interaction effect of time and cognitive ability, Wilks's $\Lambda = .98$, $F(6, 189) = .66$, $p = .68$, $\eta^2_p = .02$, nor the interaction effect of class type and cognitive ability, Wilks's $\Lambda = .97$, $F(6, 193) = 3.08$, $p = .05$, $\eta^2_p = .03$, were significant.

Univariate analyses for the main effect of time, the main effect of class type, the interaction of time and class type, as well as the covariate cognitive ability were performed to understand the multivariate results better. The time × cognitive ability interaction and the class type × cognitive ability interaction were not examined further, as they did not reach statistical significance at the multivariate level. Bonferroni adjustment was conducted, and therefore the alpha level for

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Table 3. Results for the Matched Sample (N = 198) and the Overall Sample (N = 1037, in Parentheses) of the Univariate Analyses of Coariance (ANCOVA) With Repeated Measures to Test the Effects of Time and Class Type (Gifted vs. Regular) on Social Self-Concept and School-Related Attitudes and Beliefs Over Four Waves of Measurement.

	Social self-concept of acceptance			Social self-concept of assertiveness			Interest in school			Student–teacher relationship			Social tension		
	F	p	η^2_G	F	p	η^2_G	F	p	η^2_G	F	p	η^2_G	F	p	η^2_G
Time	8.74 (19.86)	<.01 (<.01)	.02 (.01)	6.07 (4.83)	<.01 (.02)	.01 (.01)	4.19 (8.95)	.04 (<.01)	.01 (.01)	13.18 (23.86)	<.01 (<.01)	.02 (.02)	5.37 (17.69)	.02 (<.01)	.01 (.01)
Class type	0.99 (1.86)	.32 (.17)	.00 (.00)	1.77 (.21)	.19 (.64)	.01 (.00)	Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*		
Cognitive ability (covariate)	1.27 (3.35)[a]	.26 (.07)	.00 (.00)	6.93 (6.46)[a]	.01 (.01)	.02 (.01)	Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*		
Time × class type	3.17 (7.71)	.02 (<.01)	.01 (.01)	1.03 (.79)	.38 (.49)	.00 (.00)	18.58 (15.85)	<.01 (<.01)	.03 (.01)	6.13 (7.07)	.01 (<.01)	.01 (.01)	0.07 (1.16)	.79 (.18)	.00 (.00)
Time × cognitive ability	Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*		
Time × class type × cognitive ability	Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*			Multivariate result *ns*		

Note. ns = not significant. Differences between the matched sample and the overall sample are highlighted in gray. Univariate analyses (ANCOVA) were only examined if the multivariate results (MANCOVA) were significant.
[a]Multivariate result not significant.

the ANCOVAs for the two social self-concepts was set at .05/2 = .025. Table 3 documents the results of the univariate analyses of covariance with repeated measures for both social self-concepts.

Social self-concept of acceptance. The results of the univariate analysis showed significant changes in social self-concept of acceptance over time, $F(2.78, 539.44) = 8.74$, $p < .01$, $\eta^2_G = .02$ (small effect size according to Cohen, 1988). This main effect of time was linear, $F(1, 194) = 8.36$, $p < .01$, $\eta^2_G = .01$, as well as cubic, $F(1, 194) = 21.26$, $p < .01$, $\eta^2_G = .02$, suggesting an overall improvement of social self-concept of acceptance as well as increases and decreases over time. These changes over time were qualified by differences in the development over time between the class types (interaction effect of time and class type, $F(2.78, 539.44) = 3.18$, $p = .02$; small effect size, $\eta^2_G = .01$; see Figure 1). Pair-wise comparisons revealed the following results: After a significant increase for the students in gifted classes within the first month of secondary school (significant difference between the first and the second wave of measurement, $p < .01$), the self-concept of social acceptance decreased until the end of the first half of fifth grade (significant difference between the second and the third wave of measurement, $p < .01$), and it remained relatively stable afterward (no significant difference between the third and the fourth wave of measurement). There were no significant changes over time for students in regular classes, no significant mean differences between the class types at the four waves of measurement (all ps > .07), and there was no main effect of class type, $F(1, 194) = .99$, $p = .32$, $\eta^2_G < .01$. Cognitive ability was not significantly related to social self-concept of acceptance, $F(1, 194) = 1.27$, $p = .26$, $\eta^2_G < .01$.

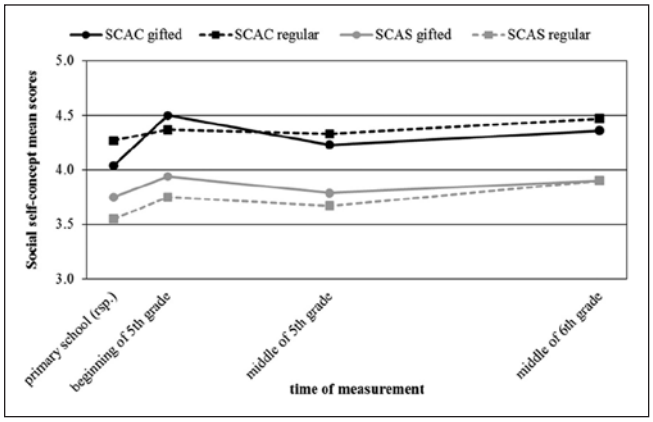

Figure 1. Development of social self-concept of acceptance (SCAC) and social self-concept of assertiveness (SCAS) over time for students in gifted classes and regular classes (range from 1 to 5).

Self-concept of assertiveness. The results of the univariate analysis showed significant changes in social self-concept of assertiveness over time, $F(2.81, 545.80) = 6.07$, $p < .01$, small effect size of $\eta_G{}^2 = .01$. This main effect of time was linear, $F(1, 194) = 8.37$, $p < .01$, $\eta^2_G = .01$, and cubic, $F(1, 194) = 11.04$, $p < .01$, $\eta^2_G = .01$, which indicated a discontinuous improvement of social self-concept of assertiveness over time. Simple contrasts showed significant differences between the first and the second wave of measurement, no difference between the second and the third wave of

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measurement, and another significant increase up to the fourth wave of measurement. There was no significant main effect of class type, $F(1, 194) = 1.77$, $p = .19$, $\eta^2_G = .01$ and no significant interaction effect of time and class type, $F(2.81, 545.80) = 1.03$, $p = .38$, $\eta^2_G < .01$. To sum up, independent of class type, all students showed an increase in their social self-concept of assertiveness over time.

Cognitive ability was significantly related to social self-concept of assertiveness, $F(1, 194) = 6.93$, $p < .01$, $\eta^2_G = .02$; however, the effect size was small. Correlations between both variables were positive, indicating that with increasing cognitive ability, social self-concept of assertiveness increased.

School-Related Attitudes and Beliefs

The MANCOVA showed a significant multivariate effect for time, Wilks's $\Lambda = .87$, $F(3, 192) = 9.86$, $p < .01$, $\eta^2_p = .13$. Class type had no significant main effect, Wilks's $\Lambda = .97$, $F(3, 192) = 1.79$, $p = .15$, $\eta^2_p = .03$, but the interaction of class type and time was significant, Wilks's $\Lambda = .91$, $F(3, 192) = 6.44$, $p < .01$, $\eta^2_p = .09$. That is, changes in school-related attitudes and beliefs over time differed for children within gifted classes and for children within regular classes. Cognitive ability as a covariate was not significantly related to the combined measure of school-related attitudes (no main effect, Wilks's $\Lambda = .99$, $F(3, 192) = 0.53$, $p = .67$, $\eta^2_p = .01$, or interactions, Wilks's $\Lambda = .99$, $F(3, 192) = 0.45$, $p = .72$, $\eta^2_p = .01$; Wilks's $\Lambda = .99$, $F(3, 192) = 0.24$, $p = .87$, $\eta^2_p < .01$).

Guided by the overall repeated-measures multivariate analysis of variance, follow-up univariate analyses were performed for the main effect of time and the interaction of time and class type. All effects concerning the covariate and the main effect of class type were not statistically significant at the multivariate level and thus were not examined further. The adjusted alpha was set at .05/3 = .017. All results of the univariate analyses of variance with repeated measures for the school-related attitudes and beliefs are displayed in Table 3.

Interest in school. Univariate testing resulted in a nonsignificant main effect time, $F(1, 194) = 4.19$, $p = .04$, but a significant interaction effect of time and class type, $F(1, 194) = 18.58$, $p < .01$, $\eta^2_G = .03$ (small effect), indicating different developmental pathways within the different class types. In the regular classes, interest in school decreased. Thus, the usual motivational decline during secondary school was observed, which provides further evidence of motivational loss during secondary school among students (Figure 2a). However, in gifted classes, there was no decline but instead an increase in interest in school.

Student–teacher relationship. There was a significant deterioration of the student–teacher relationship (main effect time), $F(1, 194) = 13.18$, $p < .01$, $\eta^2_G = .02$. The strength of the association was of small effect size. As indicated by the significant interaction of time and class type, $F(1, 194) =$

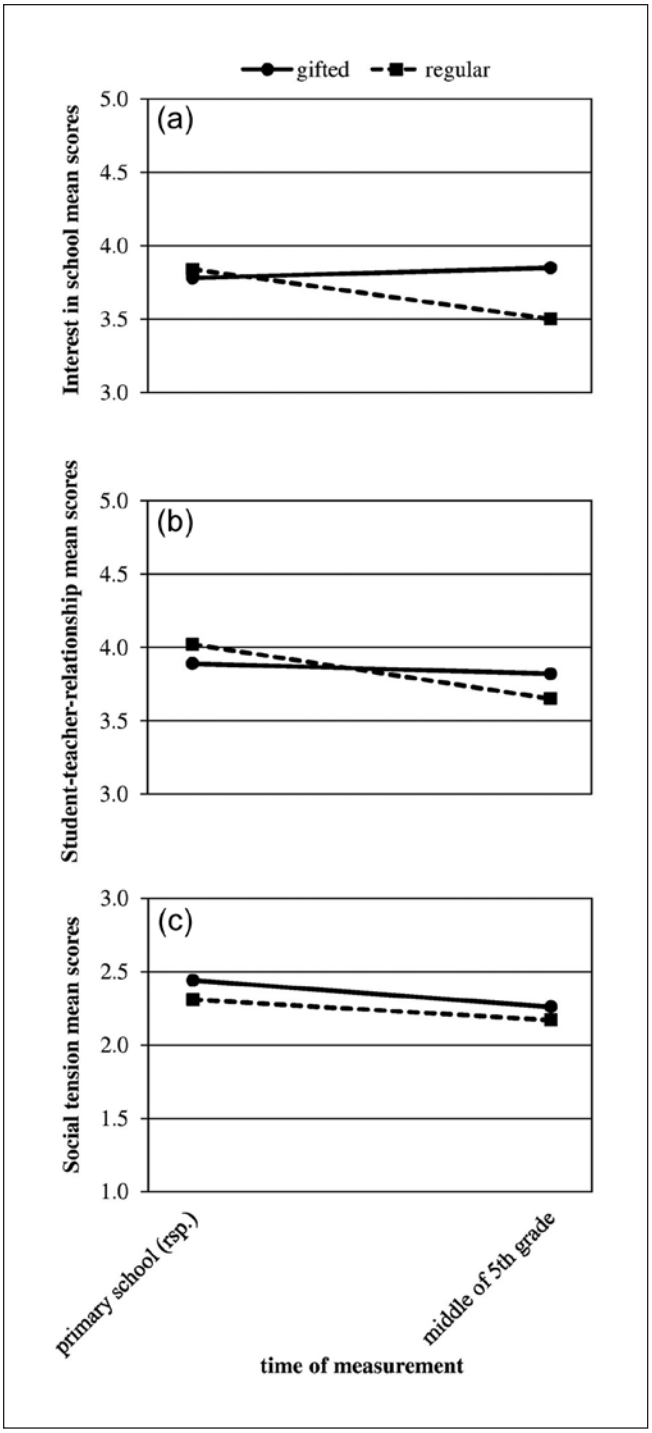

Figure 2. Development of (**a**) interest in school, (**b**) student–teacher relationship, and (**c**) social tension in class over time for students in special classes for the gifted and regular classes (range from 1 to 5).

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6,13, $p = .01$, small effect size of $\eta^2_G = .01$, in the middle of fifth grade students in gifted classes rated their relationships with their teachers only slightly lower than they did in their ratings at the beginning of fifth grade. In contrast, students in regular classes appraised their student–teacher relationships more negatively in the middle of fifth grade than they did in their ratings at the beginning of fifth grade (Figure 2b).

Social tension. The results of the univariate tests showed that social tension declined over time (main effect of time, $F(1, 194) = 5.37$, $p = .02$, $\eta^2_G = .01$; see Figure 2c). This effect was small and independent of class type (no significant interaction of class type and time, $F(1, 194) = .72$, $p = .79$, $\eta^2_G = .01$).

Discussion

Positive social and emotional outcomes and developments represent important educational goals; however, socioaffective variables have rarely been analyzed in the context of full-time ability grouping of the gifted. The present study investigated the relation of ability grouping of gifted students to their social self-concepts (social self-concept of acceptance and social self-concept of assertiveness) and school-related attitudes and beliefs (interest in school, student–teacher relationship, and social tension in class). To this end, we compared students in gifted classes with full-time ability grouping with students in regular classes within the first 18 months in secondary school. We were mainly interested in the impact of ability grouping, and therefore we controlled for possibly confounding factors like cognitive ability, sex, socioeconomic status, and school by matching students in both class types (gifted vs. regular) for these variables.

Our results revealed that attending a gifted class had initially positive effects on students' social self-concept of acceptance but no effects on social self-concept of assertiveness. Although students in regular classes showed a decline of interest in school and student–teacher relations, which is typical for students in secondary school, students in gifted classes reported no such decline but stable interest in school and student–teacher relations, instead. Mostly, we found small effects, which can in part be explained by our matching procedure. In addition, the small size of the effects found could have been expected as typically "small to moderate affective effects are produced when gifted children are grouped with like-ability or like-performing peers" (Rogers, 2007, p. 389). Furthermore, even small mean differences and effect sizes may be important. The development of socioaffective variables is related to motivation, individual stress level, or achievement, and thus our results are of high practical relevance.

Social Self-Concepts

Consistent with our hypothesis, the multivariate results indicated different developments of students' social self-concepts in both class types. The results of the univariate analyses allow a more differentiated evaluation of these findings.

Social self-concept of acceptance. The social self-concept of acceptance of students in gifted classes increased significantly during the first month in school, whereas there were only negligible changes for students in regular classes. This finding is consistent with research showing that contact with intellectually comparable peers has a beneficial effect on the socioaffective development of gifted children (e.g., Rogers, 2007). A number of possible explanations might account for this finding. First of all, an assimilation effect along the lines of the "basking-in-reflected-glory" effect (Cialdini et al., 1976) might be responsible. According to this idea, belonging to a prestigious group (in this case, a special class for the gifted) results in a more positive appraisal of certain aspects of oneself, such as self-concept or self-esteem. Furthermore, the children may benefit from the new experience of belonging to a large group of intellectually comparable peers and may therefore no longer perceive themselves as part of a minority (Fiedler, Lange, & Winebrenner, 2002). They may also no longer feel alienated or different from their classmates (Morelock & Feldman, 2003) and may be at lower risk of experiencing peer rejection because of their high academic achievement (Coleman & Cross, 2000).

However, the increase in social self-concept of acceptance at the beginning of fifth grade in gifted classes was a passing phenomenon. One can assume that with increasing age, students develop a more differentiated and realistic view of themselves and their social situation. This, in turn, might lead to changes in their social self-concept. Of note, Preckel, Zeidner, Goetz, and Schleyer (2008) detected a negative correlation between social self-concept and individual achievement when controlling for academic self-concept. Accordingly, the higher the students' academic achievement—even in special classes for the gifted—the higher their risk of labeling, negative stereotyping, and social isolation (Preckel et al., 2008).

Social self-concept of assertiveness. The interaction effect between time and class type noted above did not apply to social self-concept of assertiveness. In both class types, the social self-concept of assertiveness increased within the first month of the fifth grade, remained stable until the middle of fifth grade, and then increased again until the middle of sixth grade. It has to be taken into account that the reliabilities of the social self-concept of assertiveness scale

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were somewhat lower than for the social self-concept acceptance scale. Further research is needed to replicate and clarify this finding. Most studies on social self-concept focus on social acceptance, whereas the component of assertiveness has largely been neglected (see also Berndt & Burgy, 1996). However, it might be worthwhile to take a closer look at the different facets of social self-concept as there are diverging effects. For example, Preckel, Niepel, Schneider, and Brunner (2013) investigated reciprocal effects of both social self-concept dimensions with academic self-concept in early adolescence and found positive reciprocal effects for social self-concept of assertiveness but negative reciprocal effects for social self-concept of acceptance with academic self-concepts.

School-Related Attitudes and Beliefs

As expected, we found a significant (multivariate) interaction of time and class type for the development of school related attitudes and beliefs. This interaction effect will be discussed separately for the three constructs interest in school, student–teacher relationship, and social tension in class.

Interest in school. Ability grouping is often motivated by the goal to preserve interest in school and to prevent frustration, boredom, and subsequent demotivation (Baker, Bridger, & Evans, 1998; Preckel et al., 2010). Indeed, we found that students in gifted classes showed stable interest in school over time, whereas in regular classes, interest in school decreased. A number of explanations may be offered for this development. Some authors argue that in homogenous classes, teachers can focus more on their students' individual needs for autonomous learning and for opportunities to pursue their own learning interests (Rogers, 2007). They can create academically more challenging tasks and thus prevent boredom (Tiedemann & Billmann-Mahecha, 2004). Furthermore, the level of participation and individualization plays a crucial role in the development of interest in school (Hoekman, McCormick, & Gross, 1999). Thus, smaller class sizes and more instructional time could explain the stable interest in school of children within gifted classes. Although many researchers assume that school-related attitudes and beliefs such as interest in school are indeed related to class size, to our knowledge, there are virtually no studies investigating these relationships directly (see also Harman, Egelson, Hood, & O'Connell, 2002). When correlating class size with the dependent variables in our study, only one significant correlation was found for interest in school in the middle of the fifth grade (matched sample: $r = -.26$, $p = < .01$; overall sample: $r = -.11$, $p = <.01$). Because of the limited database at hand, it still remains unclear whether the number of classmates in fact influences factors such as interest in school.

Student–teacher relationship. The student–teacher relationship deteriorated over time in the regular classes, whereas it remained constant in the gifted classes. Once again, differences between gifted classes and regular classes such as smaller class sizes and more instructional time could explain the stable student–teacher relationship within the gifted classes. In the case of the gifted classes in our study, a better student–teacher relationship was accompanied by higher interest in school. Skinner, Furrer, Marchand, and Kindermann (2008) found that perceived teacher support had a significant positive effect on engagement and satisfaction in school. These findings can be interpreted in terms of the stage-environment fit theory of Eccles and Midgley (1989), which states that the student–teacher relationship plays an important role in motivational loss during secondary school.

Social Tension. We found that social tension decreased independent of class type. In a literature review, Rogers (1998) concluded that being placed in a group with intellectually comparable peers is beneficial for children of all ability levels in terms of social interaction. The children in our sample may therefore have perceived less social tension due to the transition to the top track of secondary school.

Cognitive Ability

Of note, only social self-concept of assertiveness was positively related to the covariate cognitive ability; there were no significant associations for all other variables under study (neither main effects nor interactions). Stated differently, we found no evidence that more intelligent children benefit most from special classes for the gifted in terms of social self-concept of acceptance, school-related interest, or student–teacher relations. The nonexistent main effect of cognitive ability might be partly explained by the fact that we studied above-average intelligent students within the top track of the German three-tier secondary school system. That is, the sample of the present study was rather homogenous with respect to cognitive ability. Furthermore, the nonsignificant interaction effects indicate that cognitive ability is not the crucial factor for the positive development of social self-concept of acceptance, interest, and student–teacher relations within the gifted classes. Thus, other differences between students in both class types might explain these findings. For example, another study on ability grouping of gifted students found students in gifted classes to differ from students in regular classes in their need for cognition (Schneider, Stumpf, Preckel, & Ziegler, 2012). Even when controlling for other factors like cognitive ability, sex, or socioeconomic status, students in gifted classes had a considerably higher intrinsic motivation to engage in and to enjoy thinking. This need might better be met in gifted classes leading to a higher

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interest in school or better student–teacher relations. However, more research is needed here.

Limitations

With the exception of cognitive ability, all constructs in our study were assessed through self-report instruments that may be subject to response sets, such as social desirability and stereotyping. The repeated presentation of the same items might cause motivational fall-offs in students. Finally, the retrospective assessment at the first wave of measurement that aimed at experiences in fourth grade might result in a recall bias. To minimize this latter risk, the first wave of measurement took place within the first week of school, so that students would be able to complete the questionnaire with their experiences from elementary school still as fresh as possible in their minds.

When interpreting the findings of the current study, it is crucial to bear in mind that we examined a selective sample. We studied fifth-grade students, all of whom attended schools of the top track of the German secondary school system. In addition, all these schools provided gifted classes. However, we built our hypotheses on findings from international studies. The support of most of our hypotheses could indicate a certain generalizability of our results to other countries or educational systems. Future research will show whether or not the results of the present study can be generalized to schools that offer only gifted classes, or to other cultures.

In our sample, the students attending gifted classes were younger than those in regular classes. However, we found only three rather small significant correlations ($r < .20$) between age and the dependent variables in all waves of measurement (see the appendix). Thus, age differences between students in both class types did not explain our findings.

Four out of 14 internal consistency reliabilities were less than .70. The scales we used are well established in empirical research. Furthermore, our sample is very homogenous and this fact might at least partly explain the low alphas. However, most assessments were of sufficient to good reliability.

Another potential drawback of our study is the selection process resulting from statistical matching. A particular problem was that for students with an extremely high cognitive ability, no match could be found in the regular classes. However, the fact that students in gifted classes with and without matches in regular classes only differed significantly with respect to cognitive ability speaks in favor of the representativeness of our subsample. By keeping variables like sex, socioeconomic status, and school constant over class type, no effects could be found for these variables within our sample. Other samples might detect gender differences or differences related to socioeconomic status. However, the advantage of our approach is that differences between the matched students can be attributed with more certainty to ability grouping. Although we attempted to control for possible confounding factors by the matching procedure, and although a priori differences between students in gifted and regular classes in the variables under study were excluded, further possible confounds and group differences that were not assessed in our study could still contribute to explaining our results. However, a higher level of experimental control was not feasible in a field study with a quasi-experimental design.

Implications and Directions for Future Research

Visiting special classes for the gifted is positively related to the development of social self-concept of acceptance and to the development of school-related interest and student–teacher relationships. Accordingly, an intellectually challenging environment and being with equally able peers seem to be decisive factors for fostering social acceptance and a positive class atmosphere. Findings for other grouping practices indicate that this positive development can also be accomplished through part-time ability grouping (e.g., Adams-Byers et al., 2004). That is, at least temporary ability grouping seems to be a necessary albeit not always sufficient way to promote a positive socioaffective development of gifted students.

Future directions. Research focusing on the long-term changes in social self-concepts and school-related attitudes and beliefs is needed to ascertain whether the effects found in our study are stable or transitory. Furthermore, future research should adopt a differential perspective, attempting to identify characteristics of gifted students that account for interindividual differences in the development of social-emotional variables. In the study at hand, we took some of the possibly confounding variables into account. However, cognitive ability had hardly any effects on the variables under study. Thus, future research needs to control for other variables that might be influential here (e.g., need for cognition). In addition, gender composition of gifted classes should be taken into account as in most classes there is an imbalanced gender ratio with girls representing the minority. Here, we only controlled for the students' sex, but it is plausible that the gender ratio might influence social self-concept and school-related attitudes and beliefs as well (see Preckel et al., 2008).

To conclude, the mechanisms behind the effects of full-time ability grouping of the gifted on socioemotional outcomes, such as school-related attitudes and beliefs or social self-concepts, have until now remained largely unexplored. More research is needed to fill this gap. For the development and evaluation of educational interventions for the gifted, it is crucial to isolate the most important of these effects.

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Appendix

Correlations Among Measures of Social Self-Concept and School-Related Attitudes and Beliefs (All Four Waves of Measurement), Sex, Class Type, IQ and Age for the Matched Sample (N = 198).

	SCAC 1	SCAC 2	SCAC 3	SCAC 4	SCAS 1	SCAS 2	SCAS 3	SCAS 4	IN 1	IN 3	STR 1	STR 3	ST 1	ST 3
SCAC 2	.49**	—												
SCAC 3	.38**	.53**	—											
SCAC 4	.39**	.18**	.30**	—										
SCAS 1	.38**	.33**	.25**	.22**	—									
SCAS 2	.36**	.54**	.37**	.11	.58**	—								
SCAS 3	.24**	.39**	.58**	.19**	.44**	.52**	—							
SCAS 4	.26**	.11	.33**	.53**	.39**	.25**	.45**	—						
IN 1	.23**	.10	.02	.02	.13	.05	−.02	−.05	—					
IN 3	.08	.13	.02	−.04	.12	.06	.02	−.05	.42**	—				
STR 1	.32**	.26**	.18**	.20**	.13	.13	.08	.09	.51**	.19**	—			
STR 3	.19**	.34**	.20**	.02	.04	.11	.15*	.05	.17*	.46**	.43**	—		
ST 1	−.40**	−.26**	−.16*	−.31**	−.22**	−.21**	−.17*	−.19**	−.33**	−.07	−.54**	−.14*	—	
ST 3	−.26**	−.30**	−.53**	−.13	−.18*	−.30**	−.38**	−.30**	−.18*	−.20**	−.19**	−.24**	.26**	—
Sex	.17*	.12	.05	.13	.05	.01	−.02	.07	.17*	.10	.33**	.22**	−.34**	−.21**
Class type	.13	−.10	.06	.08	−.12	−.11	−.07	.00	.07	−.25**	.08	−.12	−.08	−.07
Cognitive ability	.04	.02	−.10	.06	.15*	.08	.14*	.23**	−.01	−.05	.03	.11	−.07	−.05
Age	.08	−.03	.04	.07	.15*	.14	.07	.19*	.11	−.10	.17*	.03	−.11	.06

Note. SCAC = social self-concept of acceptance; SCAS = social self-concept of assertiveness; IN = interest in school; STR= student–teacher relationship; ST = social tension. Numbers 1 to 4 represent waves of measurement.
*$p < .05$. **$p < .01$.

Authors' Note

Data of this article stem from a longitudinal study of Franzis Preckel, which focuses on motivational and self-concept development in high school students. All statements expressed in this article are the authors' and do not reflect the official opinions or policies of the authors' host affiliations.

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Notes

1. Special thanks to Dipl.-Inf. Sebastian Vogl, who designed the Java program used to identify the "statistical twins."
2. Data stem from a large-scale research project. Students without an IQ score ($n = 390$) or with an unknown socioeconomic status ($n = 502$) have been excluded from the overall sample of 1,446 participants (of whom 291 children attended gifted classes). Of the remaining 586 students, another 23 children were eliminated because their IQ score was more than two standard deviations lower than the population mean and therefore seemed extremely unlikely for a student in the highest track of secondary school. In the end, a data pool consisting of 151 students in gifted classes and 380 students in regular classes was available for the matching process. We were able to assign a statistical match from a regular class to 67% of the 151 students in gifted classes. The statistical matches and the remaining children in the gifted classes who were not selected for the study at hand only differed significantly regarding IQ, $t(221) = -4.50$, $p < .01$; no significant difference with respect to sex and age. For the most intelligent children in gifted classes, it was not possible to find a comparably intelligent match in the regular classes.
3. We used the formula for unequal group sizes:

$$d = \frac{|M1 - M2|}{\sqrt{\frac{(n1-1)SD1^2 + (n2-1)SD2^2}{n1+n2-2}}}$$

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