First publ. in: Contemporary Educational Psychology ; 33 (2008), 1. - S.78-96

Female 'big fish' swimming against the tide: The 'big-fish-little-pond effect' and gender-ratio in special gifted classes

Franzis Preckel Moshe Zeidner Thomas Goetz
Esther Jane Schleyer

Abstract

This study takes a second look at the "big-fish-little-pond effect" (BFLPE) on a national sample of 769 gifted Israeli students (32% female) previously investigated by Zeidner and Schleyer (Zeidner, M., & Schleyer, E. J., (1999a). The big-fish-little-pond effect for academic self-concept, test anxiety, and school grades in gifted children. *Contemporary Educational Psychology, 24*, 305–329). The reanalysis of the data, using HLM methodology, was designed to partition individual differences from aggregate group variance, as well as to test a number of focused hypotheses regarding the effects of gender and gender-ratio in class on self-concept. With respect to self-concept, the BFLPE hypothesizes that it is better to be a good student in an average-ability reference group than to be a good student in a high-ability reference group. Prior studies explored the BFLPE comparing gifted students in different educational contexts. Here, the BFLPE was exclusively investigated within special gifted classes. Results supported the BFLPE for academic self-concept. Furthermore, whereas *girls'* academic self-concept was negatively influenced by gender-ratio (percentage of boys in class), gender-ratio had no significant influence on *boys'* academic self-concept.

Keywords: Big-fish-little-pond effect; Academic self-concept; Social self-concept; Gifted education; Gender-ratio

1. Introduction

This study reports further analyses of a data set based on a national sample of gifted students, which was previously investigated by Zeidner and Schleyer (1999a, 1999b, 1999c, 1999d). In their investigation of the big-fish-little-pond effect (BFLPE), Zeidner and Schleyer analyzed academic self-perceptions of gifted students in regular mixed-ability classes in addition to those in special gifted classes. The BFLPE hypothesizes that it is better for academic self-concept to be a big fish in a little pond (i.e., good student in a reference group of average ability) than to be a small fish in a big pond (i.e., good student in a reference group of high ability). Marsh and Parker (1984) proposed a social frame of reference model to explain the BFLPE. According to this model, self-perceptions in educational settings are largely shaped by the process of social comparison. With increasing ability level of a reference group (school, class, etc.), students often compare themselves with high ability peers and are compared by their teachers with more intellectually able peers, which in turn affects the feedback (e.g., grades) students receive. Thus, the likelihood for upward social comparisons with more able students, as well as the likelihood to get lower grades, increases with ability level of the reference group. This, in turn, results in lower academic self-perceptions (overviews see Köller, 2004; Marsh, 2005; Marsh & Craven, 2002). The findings of Zeidner and Schleyer (1999a, 1999b, 1999c, 1999d) supported the BFLPE. Although attending selective gifted classes is likely to cause feelings of pride and to improve academic self-concept (assimilation or "basking-in-reflected-glory"; Cialdini et al., 1976) the negative effects of high-achieving environments due to the BFLPE seem to be stronger than positive assimilation effects (see also Marsh, Kong, & Hau, 2000).

Like most other investigations on the BFLPE for the gifted, Zeidner and Schleyer (1999a, 1999b, 1999c, 1999d) have used different educational context (e.g., regular versus special gifted classes) to operationally define the ability level of the respective reference group. Thus, ability level was defined categorically by the two types of educational contexts. These authors found that the BFLPE held for low and high achieving gifted students and they concluded that attending selective educational settings, such as special classes for the gifted, leads to reduced academic self-concept for students of all ability levels (see also Marsh, Chessor, Craven, & Roche, 1995; Marsh & Rowe, 1996). However, if the BFLPE holds for all ability levels, it should also be evidenced *within* special gifted classes because the dispersion of ability and achievement levels within the gifted group is sufficiently broad to allow for such social comparisons (Lubinski, Benbow, & Morelock, 2000). In fact, the BFLPE would appear to hold for the entire range of intellectual ability, and there should be no "threshold" effect (e.g., a sufficiently high level of individual ability that "immunizes" against the negative effects of upward social comparisons). McCoach and Siegle (2003), however, found that gifted underachievers and gifted achievers displayed comparably high academic self-perceptions. These authors discussed the possibility that self-perceptions of *cognitive abilities* are more influential for the formation of academic self-concept in gifted students than self-perceptions of *academic achievements*. Thus, a primary aim of this study was to test the tenability of the BFLPE *within* special gifted classes as the BFLPE has not yet been studied, to our knowledge, in special gifted classes exclusively.

Furthermore, the BFLPE is well documented when studying group level data for the effects of grouping the gifted. However, there is only little empirical evidence detailing under what conditions and for whom the BFLPE will be of varying strength (see for example McFarland & Buehler, 1995). That is to say, it is likely that there are individual or

subgroup differences with respect to the extent that (gifted) students are influenced by the BFLPE. The investigation of the factors that are related to these differences is of high practical concern, shedding light on possible factors that influence the effects of gifted ability grouping like achievement goals, general level of self-esteem, or presence or absence of encouraging environments (Dai, 2004; Plucker et al., 2004). Another factor that is of considerable interest in the present study is the composition of gifted classes with respect to gender (gender-ratio). Given the frequently observed gender imbalance in gifted classes, a second aim of this study was to probe how this 'minority status' of gifted female students affects academic self-perceptions. Specifically, we set out to investigate whether gender-ratio in gifted classes has differential effects on the self-concept of gifted boys and girls. This adds a new and relatively unresearched angle to the investigation of the effects of ability grouping for the gifted, which may contribute to identifying optimal educational training options for this special group of students.

In contrast to prior reports published by Zeidner and Schleyer (1999a, 1999b, 1999c, 1999d), we did not focus on comparing gifted students in special versus regular classes in the present study. Instead, gifted students in special gifted classes of varying achievement levels were investigated. This analysis of the BFLPE within gifted students has not been conducted before. In addition, in contrast to Zeidner and Schleyer (1999a, 1999b, 1999c, 1999d), who separately examined either elementary school students (Zeidner & Schleyer, 1999a, 1999c) or junior high school students (Zeidner & Schleyer, 1999d), in the present study both groups were combined and analyzed together—statistically controlling for effects of school type. Also, different from the prior analyses on the Zeidner and Schleyer data set, we used hierarchical linear or multi-level analytic methodology in the present study. Use of multi-level modelling procedures allowed us to simultaneously consider both attributes of individuals and groups when analyzing effects on individual outcome measures, primarily self-concept. Finally, in direct contrast to the initial analyses of the Zeidner and Schleyer data set, the present study looked at the effect of class gender-ratio on self-concept. To our knowledge, this question has not been heretofore addressed with respect to gifted classes.

2. The big-fish-little-pond effect on self-concept

2.1. Academic self-concept

Most studies examining the BFLPE have focused on *academic* self-concept. A vast amount of empirical evidence has been garnered in support of the BFLPE for academic self-concept in students, across diverse educational settings, populations, and cultures (e.g., Marsh & Craven, 2002; Marsh & Hau, 2003). The BFLPE has been repeatedly attested to in gifted student populations (e.g., Craven, Marsh, & Print, 2000; Marsh et al., 1995; Rindermann & Heller, 2005; Shields, 2002; Zeidner & Schleyer, 1999a).

Typically, the BFLPE has been operationalized and assessed at the following two levels:

(a) *Individual* level—operationalized by observing a positive relation between individual achievement and academic self-perceptions. In a comparison study of 26 countries, Marsh and Hau (2003) report a range of effect sizes from 0.14 to 0.63 ($M = 0.38$) for the BFLPE at the individual level;

(b) *Group* level—operationalized by observing a negative relation between average achievement level of the reference group (e.g., class or school) and individual academic

self-perceptions, when statistically controlling for the effect of individual achievement on individual self-concept (effect sizes ranged from −0.02 to −0.36, $M = -0.21$; Marsh & Hau, 2003).

As noted previously, few studies, if any, have looked at the BFLPE *within* the gifted group or within special gifted classes.

The BFLPE has also been observed when new groups of students are formed and the social group and frame of reference is altered for students. A case in point is when new homogeneous ability groups are formed (e.g., special gifted classes) for gifted students previously studying in regular classes. In this case, previously high achieving students in regular classes become part of a reference group in which they may show only average achievement outcomes. However, the BFLPE may also be observed within stable learning groups, as is the case when the ability level of the reference group accelerates at a greater pace than the individual ability level of a specific student. Thus, a student can find himself or herself increasingly becoming a 'little fish' as the surrounding pond grows increasingly bigger (c.f. Marsh, 1987, 1994).

2.2. Social self-concept

The BFLPE does not typically hold for non-academic facets of self-concept, such as social self-concept (Marsh et al., 1995; Zeidner & Schleyer, 1999a). Social self-concept is defined as self-perceptions of one's social competence with respect to social interaction with others. Social self-concept tends to be derived from the assessment of one's social behaviour within a given social context (Markus & Wurf, 1987). The vast majority of studies looking at the association between social self-concept and academic achievement report these two constructs to be unrelated (Ablard, 1997; Berndt & Burgy, 1996; Kelly & Jordan, 1990). Relatively few studies document positive correlations between academic achievement and social self-concept (e.g., Wentzel & Erdley, 1993). If a positive relationship between academic achievement and social self-concept is found, it may plausibly be accounted for by the mediating effect of academic self-concept, particularly given the positive correlation between academic and social self-concept (Berndt & Burgy, 1996). We would not expect a meaningful relationship between academic achievement and social self-concept when controlling for academic self-concept. The positive correlation between social and academic self-concept can be explained with reference to models of self-concept, which assume that self-evaluations of more specific self-concepts (e.g., academic and social self-concept) can be located in a hierarchical structure on a level below general self-concept (e.g., Byrne & Shavelson, 1996; Shavelson, Huber, & Stanton, 1976).

3. Effects of class gender-ratio on academic self-concept

All of the gifted classes investigated in the present study, based on the Zeidner and Schleyer data sets, were comprised of a greater proportion of males than females (as is typically the case for gifted classes in Israel), where the percentage of males per class ranged from 52% to 85%. Thus, in all classes, gifted females held varying degrees of 'minority status'. This unbalanced gender-ratio can be found in many programs for the gifted (Feldhusen & Jarvan, 2000), especially in programs for the mathematically gifted (Lubinski et al., 2000). To what extent does the observed gender-ratio imbalance influence academic self-perceptions? To our knowledge, there are no available studies that have investigated the

effect of gender-ratio in special gifted classes on academic self-perceptions. Therefore, we first document findings on the related question of gender effects of ability-grouping. We use social comparison theory as a theoretical framework to shed light on the foregoing question.

3.1. Gender effects of ability-grouping

Empirical evidence on differential effects of ability-grouping for boys and girls is sparse. Catsambis and colleagues (Catsambis, Mulkey, & Crain, 1999, 2001) examined the effects of gender and ability grouping in Mathematics and English in a large national sample. They found strong interactions for various effects of ability grouping by gender and propensity for a high or low track (predicted by grades, standardized achievement scores, teacher evaluations, socio-economic-status, etc.). Female students with a propensity for a high track were more positively affected by tracking than comparable males; females with a propensity for a low track were more negatively affected by tracking than comparable males. The authors argued that because of the heightened sensitivity of girls to external cues, assimilation effects of ability grouping might be more influential for girls than for their male counterparts. "An assimilation or reflected glory effect accounts for high track females' higher self-concept and, correspondingly, low track females' lower self concept." (Catsambis, Mulkey, & Crain, 2001, pp. 87–88). On the other hand, male students with a propensity for a high track were more negatively affected by tracking, while males with a propensity for a low track were more positively affected by tracking, thus providing support for the BFLPE. Assimilation effects (reflected glory) and contrast effects (BFLPE) might vary in strength as a function of gender group membership.

It has been documented that gifted girls, when compared to gifted boys, show less confidence in their achievement potential (Kerr & Nicpon, 2003). However, this might not be valid for those gifted girls who choose to participate in selective gifted programs. With respect to the findings of Catsambis et al. (1999, 2001), one would expect no gender differences or even higher academic self-perceptions of females in special gifted classes, when compared to males. In accordance with this expectation, Dai (2001) found that girls who attended a special school for students of high ability had a higher academic self-concept than boys who attended this school.

3.2. Gender, gender-ratio and social comparisons in gifted-classes

As outlined above, self-perceptions in educational settings are largely shaped by the process of social comparison. Comparisons are typically carried out with others in the reference group who show some similarity on dimensions that are considered to be personally relevant in that particular situation (Festinger, 1954; Wheeler, Martin, & Suls, 1997). Gender is important for identity formation; such dimensions are personally relevant even in situations in which gender is not assumed to be related to achievement (Suls, Gaes, & Gastorf, 1979). Various studies revealed that people prefer same-sex social comparisons (e.g., Major & Forcey, 1985). This also holds for students in academic settings (Blanton, Buunk, Gibbons, & Kuyper, 1999; Wheeler & Miyake, 1992). Möller and Köller (1998) found that this preference for same-sex comparisons was independent of school subject (Math or English as a Foreign Language). Thus, it can be assumed that gifted females mostly refer to comparisons with other gifted females in their class when forming their

academic self-perceptions. Therefore, it is worthwhile to have a closer look at this particular group. Since gifted females are the minority in many programs for the gifted (Feldhusen & Jarvan, 2000), it can be assumed that females in special gifted classes represent a highly selective group.

A number of possible explanations may be offered for the frequently observed differential representation of males and females in gifted classes—in favour of males. Kerr and Nicpon (2003) documented that performance on standardized achievement tests—which are often part of selection procedures for gifted programs—favours boys at the highest levels of achievement. Second, many selection procedures for special gifted programs include teacher nominations, which may suffer from some unknown degree of gender bias in favour of boys (Busse, Dahme, & Wieczerkowski, 1986; Gagné, 1993). Third, gifted girls, more so than gifted boys, frequently conceal or hide their intellectual capabilities and potential cognitive abilities in order to avoid the costs incurred by being different from other students in their school (Kerr & Nicpon, 2003; Reis, 1998). This, in turn, decreases the likelihood of being identified as gifted and participating in gifted programs. Fourth, some studies have documented that parents tend to be more overprotective of their daughters than of their sons (e.g., Carter & Wojtkiewicz, 2000; Muller, 1998), which might decrease the probability that parents choose competitive settings for their daughters, such as special gifted classes.

Those girls who choose to participate in selective gifted programs—despite the many potential hurdles listed above—, are often particularly intellectually capable, highly motivated, high achievers, show multiple talents, and receive higher mean grades than gifted boys in the classroom (Freeman, 2004; Kerr, 1997; Lubinski & Benbow, 1992). Therefore, the same-sex reference group for social comparisons of girls in special classes is one with very high standards, which could serve to heighten the BFLPE on academic self-perceptions.

In addition, the group constellation (say, classroom) in which students find themselves often influences which dimensions are particularly salient when they make social comparisons: People will focus on whatever aspects of themselves are most salient or distinct in a particular social setting (Markus & Wurf, 1987) and they preferably describe themselves with respect to dimensions that are underrepresented in their reference group (McGuire & McGuire, 1988; Smith & Leach, 2004). Since females are the minority in the special gifted classes examined in the present study, it can be assumed that for females, as compared to their male counterparts, gender is perceived to be relatively more salient. Societal beliefs and related gender stereotypes still view males as outperforming females in many academic achievement areas (e.g., Herbert & Stipek, 2005; Lips, 2004). This is documented in research concerned with self- and other estimates of intellectual abilities. A typical finding is that males give higher mean estimates than females for their logical, mathematical, and spatial intelligences (Bennett, 2000; Holling & Preckel, 2005), while females give higher mean estimates than males, of their musical and interpersonal intelligences (Rammstedt & Rammsayer, 2000). If the minority status of girls in special gifted classes activates gender as a salient self-schema, related gender stereotypes might also be more active in the formation of self-perceptions. Last, but not least, the unbalanced gender-ratio, leading to the minority status of females in gifted classes, could be interpreted by females as an indication of a higher suitability of these classes for boys.

This study sets out to fill a gap in BFLPE research by systematically investigating the effect of gender-ratio in special gifted classes on academic self-perceptions. It is predicted that social comparisons with a high standard reference group would lead to a strong BFLPE for girls in gifted classes. At the same time, attending special gifted classes might

lead to a stronger assimilation or 'basking in reflected glory' effect (Cialdini et al., 1976) for females than for males. If so, a positive component of the assimilation effect could counterbalance the negative effects of high achieving contexts on individual academic self-perceptions. Also, those girls who attend selective classes are likely to be a highly selective and very intellectually capable group with high mean academic self-perceptions. In sum, there should be no or only small gender differences in academic self-concept for students in special gifted classes. But, as outlined, with increasing minority status, gender might be more influential in the formation of academic self-perceptions, and girls might think that the special class is more suitable for gifted boys. This consideration would lead us to expect lower academic self-perceptions among gifted female students with increasing minority status in class.

4. Research hypotheses

Based on the review of the literature, the following research hypotheses were tested in the present study:

(1) A significant BFLPE will be observed for academic self-concept.
(2) No significant BFLPE will be observed within gifted student classes for social self-concept.
(3) Gifted boys and gifted girls studying in special gifted classes will report a comparable academic self-concept.
(4) Social self-concept and academic achievement are usually found to be unrelated. With reference to hierarchical models of self-concept we expect that if a positive relation between social self-concept (SSC) and academic achievement (AA) is found it can be explained by a mediating effect of academic self-concept (ASC): ASC will mediate the relationship between SSC and AA (AA → ASC → SSC).
(5) Class gender-ratio is hypothesized to impact on academic self-concept. Specifically, when comparing academic self-concept of students across gifted classes differing in gender-ratio, academic self-concept of girls will decrease with increasing percentage of boys in classes.

5. Method

5.1. Participants

Data for this study are based on a national sample of 1317 elementary (grades 4–6) and 1179 junior high school (grades 7–9) students in Israel.[1] Placement test scores, originally used for screening students for special programs for the gifted, were made available from

[1] The Israeli school system employs a two-stage process in identifying gifted student. The first stage involves administration of a scholastic aptitude screening test to 2nd and 3rd grade students. National cut-off scores (based on the top 15% of the students in a particular year nationwide) are employed in order to identify those students eligible for the next stage of selection. In addition, teachers are encouraged to recommend outstanding students who did not reach the cut-off score but still should be given the opportunity to participate in the final selection procedure. An advanced placement test is then group-administered for the purpose of selecting gifted children for special programs. Anywhere from 1% to 3% of the students taking this test, and obtaining the highest scores in their respective school districts, are recommended for special programs. Gifted students thus identified are generally unevenly distributed by gender, composed of approximately 70% males and 30% females.

the Ministry of Education for a subset of the sample ($n = 482$). The special students had median percentile scores of $M = 90.19$ ($SD = 11.86$). From the total sample of 2497 intellectually gifted students, a subgroup of those students who attended special homogeneous classes for the gifted was drawn ($N = 789$).

This subsample comprised of almost the entire population of gifted students enrolled in special homogeneous full-time gifted classes in the given age groups that were targeted in this study (37 classes). Following the suggestions of Felson and Reed (1986), classes including less than 10 students were not integrated in our multi-level analyses. This selection criteria resulted in analyzing 33 classes with a medium class size of about 23 students ($M = 22.62$; $SD = 5.56$). Of these 769 students, 330 were drawn from elementary school and 439 were drawn from junior high schools. The ratio of males to females was about 2:1 (31% females). Table 1 shows the sample distribution by grade level and gender.

5.2. Variables and measures

Demographic and psychological data were gathered by questionnaires that were group administered in gifted classrooms. The following variables were assessed and analyzed in the course of this study:

5.2.1. Self-concepts

Academic self-concept was assessed by a 12-item Likert type scale patterned after selected items from the experimental Hebrew translation (Zeidner, 1995) of the Academic Self-Concept subscale of Bracken's *Multidimensional Self-Concept Scale* (MSCS; Bracken, 1992). The items were translated with permission of the publisher. Bracken (1992) reported a high internal consistency of the academic self-concept subscale ($\alpha = 0.91$; range: 0.88–0.92 across grade levels 5–12; $N = 2510$; 52% females). With respect to the validity of the academic self-concept scale, Bracken found a strong correlation with general school self-concept ($r = 0.66$) and weak correlations with the self-concept of opposite-sex relations ($r = .18$) or same-sex relations ($r = .31$)—each assessed by the respective scale of Marsh's (1990) Self-Description Questionnaire-II.

In the present study, students evaluated themselves on a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*) on items gauging various facets of learning, academic compe-

Table 1
Sample distribution by grade level and gender as well as mean class size and mean achievement by grade level and gender

Grade level	Number of classes	Number of students	% Male	Mean class size	Academic achievement *M* (SD)			Gender differences in achievement *d*
					Male + Female	Male	Female	
4	5	110	62.7	22.20	91.45 (6.03)	90.90 (6.52)	92.65 (4.75)	−0.31
5	5	100	74.0	20.80	88.31 (7.04)	88.68 (6.70)	87.27 (8.00)	0.19
6	5	111	70.3	23.00	88.88 (6.82)	89.26 (6.27)	87.80 (7.90)	0.20
7	6	152	65.8	25.83	87.78 (5.96)	87.19 (6.30)	88.94 (5.26)	−0.30
8	6	146	67.1	25.00	85.13 (7.23)	83.63 (7.54)	87.82 (5.85)	−0.62
9	6	131	69.5	22.34	85.82 (7.65)	84.89 (7.80)	87.54 (7.16)	−0.35
4–9	33	769[a]	68.2	23.20	87.67 (7.10)	87.10 (7.33)	88.78 (6.57)	−0.24

[a] For 19 students there was no information for gender.

tence and scholastic performance (e.g., "Most teachers seem to like my school work", "I am bright and learn things easily"). The subscale internal consistency reliability coefficient ($\alpha = 0.85$) was satisfactory in the present sample.

Social self-concept was assessed by a scale comprised of 12 self-report items, also taken from the Hebrew rendition of Bracken's *Multidimensional Self-Concept Scale* (MSCS; Bracken, 1992). The items were translated with permission of the publisher. Bracken reported a high internal consistency of the social self-concept subscale of the MSCS ($\alpha = 0.90$; range: 0.88–0.92 across grade levels 5–12; $N = 2510$; 52% females). Concerning the social self-concept scale, Bracken refers to several of his studies which strongly report the validity of this scale. For example, he found significant correlations with self-concept of opposite-sex relations ($r = .59$), self-concept of same-sex relations ($r = .48$), and a weak correlation with general school self-concept ($r = .23$)—each assessed by the respective scale of Marsh's (1990) Self-Description Questionnaire-II. Further, the correlation of $r = .44$ between the social and academic self-concept scales of the MSCS (Bracken, 1992) indicates some commonalities of these scales. However, the size of the correlations also shows that both constructs can be differentiated from each other when using the MSCS subscales.

In the present study, students evaluated themselves on a four-point Likert scale (1 = *strongly disagree*, 4 = *strongly agree*) on items including, "I have many friends" or "People don't pay much attention to me". The subscale internal consistency reliability ($\alpha = 0.87$) was satisfactory in the present sample. An exploratory principle-axis factor analysis of the combined 24 items comprising the two self-concept scales, followed by varimax rotations, yielded two orthogonal factors, academic and social self-concept, accounting for 27% und 12% of the total variance, respectively. Item loadings ranged from 0.32 to 0.67 for the academic scale and from 0.48 to 0.77 for the social scale. In each case, items loaded substantially higher on their target factor than on their non-target factor.

5.2.2. Scholastic achievement

Students' end of year grades were gathered for two consecutive years in the following three cardinal school subjects in the Israeli school system: Mathematics, English Language, and Biblical Literature. Subject grades, gleaned from student records, were based on the conventional numeric grading scale employed in Israeli schools, ranging from 0 to 100, with higher values indicating better achievement. The mean score of two consecutive years in all three subjects was taken as a measure of scholastic achievement. Reliability of grading was comparable across grade levels (Cronbach's α of grades of two consecutive years in all three subjects: elementary $\alpha = 0.79$, junior high $\alpha = 0.81$). Also, variance of grades was comparable across grade levels (mean score of two consecutive years in all three subjects: elementary versus junior high; $F(1,731) = .43$, $p = .51$). Academic achievement scores, partitioned by grade level and gender, are shown in Table 1.

5.3. Procedure and data analyses

Demographic and individual differences data were collected via self-report instruments that were group-administered to students during regular classroom period. Students' grades were obtained directly from students' school records.

Because both individual and group level variances were considered in the present study, we used multilevel analysis via hierarchical linear modelling (Raudenbush & Bryk, 2002).

The analyses were implemented via HLM™ 5 (Raudenbush, Bryk, Cheong, & Congdon, 2001). This statistical tool allowed us to simultaneously model the effects of individual data and data aggregated across groups. For individual data, the effects of achievement and gender on academic self-concept were investigated; for data aggregated across groups, we examined the effects of mean achievement class levels and class gender-ratio on academic self-concept. For the investigation of the effect of these individual and group variables on social self-concept, academic self-concept was added as an independent variable on an individual level. For purposes of HLM analyses, all outcome and predictor variables on both the individual and class levels were standardized ($M = 0$, $SD = 1$) across the entire sample (see Aiken & West, 1991). Product terms were used to test interaction effects. In constructing the product term, we used the product of individual (z-score) standardized variables. The product terms were not restandardized. Unstandardized β weights are reported in the results section. Because all outcome and predictor variables were standardized, these unstandardized β weights correspond to standardized β weights for all but the product (interaction) variables.

Independent variables were cumulatively aggregated both for the analyses of academic self-concept and social self-concept. Integrating independent variables, step by step, allows us to investigate how the integration of the variable influences the effects of previously integrated independent variables on the outcome variable.[2]

With academic self-concept as dependent variable, three models were computed. Taking social self-concept as dependent variables, four models were computed. The models (1)–(4) included an increasing number of independent variables: (1) achievement outcomes at an individual and class level; (2) gender at an individual level, as well as gender-ratio in class; (3) cross-level interaction between gender at an individual level and gender-ratio in class (to test if boys and girls are differentially influenced by gender-ratio in class); (4) academic self-concept at an individual level (for testing the assumed mediation-mechanisms on the dependent variable social self-concept). All HLM-models were run a second time while controlling for the effects of class membership in either elementary school or junior high school on self-concepts. This was achieved by including a dummy-coded variable which coded this membership at the individual level. Because inclusion of this variable did not change the results substantially for both academic self-concept and social self-concept, only the results for the analyses without this dummy variable were reported in the next section.

6. Results

Table 1 shows the sample distribution by grade level and gender as well as information on mean class size and mean achievement level by grade level and gender. Gifted girls received significantly higher school grades than gifted boys, on average ($t = 3.09$, $p < .01$), although the effect size was rather small ($d = -0.24$). Effect sizes, by grade, are largest for grade levels 8 and 9. Contrast among gender group means indicated that gifted boys and girls were not reliably differentiated on either academic or social self-concept (girls/boys academic self-concept: $M = 3.00/2.99$, $SD = 0.42/0.42$, $d = 0.02$; girls/boys social self-concept: $M = 3.22/3.15$, $SD = 0.52/0.49$, $d = 0.14$). Academic self-concept was positively related

[2] It is important to note that the aim of calculating different models was not to compare them in terms of goodness of fit and test them in a competitive way which would result in detecting a best-fitting model, as it has often been done for linear structural equation models.

to both social self-concept ($r = .37$, $p < .01$), and achievement ($r = .46$, $p < .01$). A weak, but significant, correlation was found between academic achievement and social self-concept ($r = .14$, $p < .01$).

Tables 2 and 3 document the results of the HLM analyses. As predicted, when *academic self-concept* served as the dependent variable (see Table 2), the BFLPE was replicated in

Table 2
Results of multi-level-analysis: Effects of individual achievement, class achievement, gender, and gender-ratio (% boys in class) on academic self-concept

	Academic self-concept					
	Model 1		Model 2		Model 3	
	β	p	β	p	β	p
Individual level						
Achievement	0.57	<.01	0.58	<.01	0.58	<.01
Gender			0.07	.03	0.08	.01
Class level						
Achievement	−0.22	<.01	−0.23	<.01	−0.23	<.01
Gender ratio			−0.04	.44	−0.05	.35
Interaction term						
Gender × gender-ratio					0.10	<.01

Notes. All outcome and predictor variables on individual and class level were standardized ($M = 0$, $SD = 1$) across the entire sample, so that unstandardized β weights which are reported in the table correspond to standardized β weights. The product terms were not restandardized and consequently unstandardized β weights are reported concerning the interaction term. Gender was scaled as follows: females = 0, males = 1. Gender ratio: Percentage of boys in class. Concerning the significance of the βs, exact p-values are depicted in the case that they are not below .01.

Table 3
Results of multi-level-analysis: Effects of individual achievement, class achievement, gender, and gender-ratio (% boys in class), and academic self-concept on social self-concept

	Social self-concept							
	Model 1		Model 2		Model 3		Model 4	
	β	p	β	p	β	p	β	p
Individual level								
Achievement	0.16	<.01	0.14	<.01	0.14	<.01	−0.10	.04
Gender			−0.06	.10	−0.05	.16	−0.07	.06
Academic self-concept							0.40	<.01
Class level								
Achievement	−0.03	.61	−0.01	.83	−0.01	.80	0.08	.17
Gender ratio			0.01	.86	0.00	.94	0.01	.84
Interaction term								
Gender × gender-ratio					0.06	.16	0.02	.56

Notes. All outcome and predictor variables on individual and class level were standardized ($M = 0$, $SD = 1$) across the entire sample, so that unstandardized β weights which are reported in the table correspond to standardized β weights. The product terms were not restandardized and consequently unstandardized β weights are reported concerning the interaction term. Gender was scaled as follows: females = 0, males = 1. Gender ratio: Percentage of boys in class. Concerning the significance of the βs, exact p-values are depicted in the case that they are not below .01.

the HLM analysis. Accordingly, individual achievement was *positively* related to academic self-concept. Furthermore, when controlling for the latter effect, mean class achievement level was *negatively* related to academic self-concept (Table 2, Model 1). Both effects were quite strong (β individual level: 0.57; β class level: −0.22). Also, there was a small but significant main effect for gender: When controlling for individual and group achievement, gifted boys showed higher mean values for academic self-concept than their gifted girl counterparts (Table 2, Model 2). Whereas class gender-ratio had no significant main effect, a significant interaction was observed between gender and gender-ratio (Table 2, Model 3). For the interpretation of this interaction see Fig. 1, showing the level of academic self-concept (*y*-axes) in relation to gender-ratio in class (*x*-axes) for boys (squares) and girls (triangles).

The relative size of the squares and triangles indicates the number of male and female students showing the corresponding combination of gender-ratio in class and academic self-concept; the bigger the sign, the more students there are that show the corresponding combination. The lines represent mean values of girls' (dotted line) and boys' (continuous line) academic self-concept. Note that the course of the lines can be interpreted but not their absolute values due to the fact that variability between classes in achievement has not been controlled for. That is, one cannot say that girls have higher or lower mean values than boys. Fig. 1 suggests that boys' academic self-concept was unaffected by gender-ratio because the line has a horizontal course, while girls' academic self-concept decreased with an increasing proportion of boys in class.

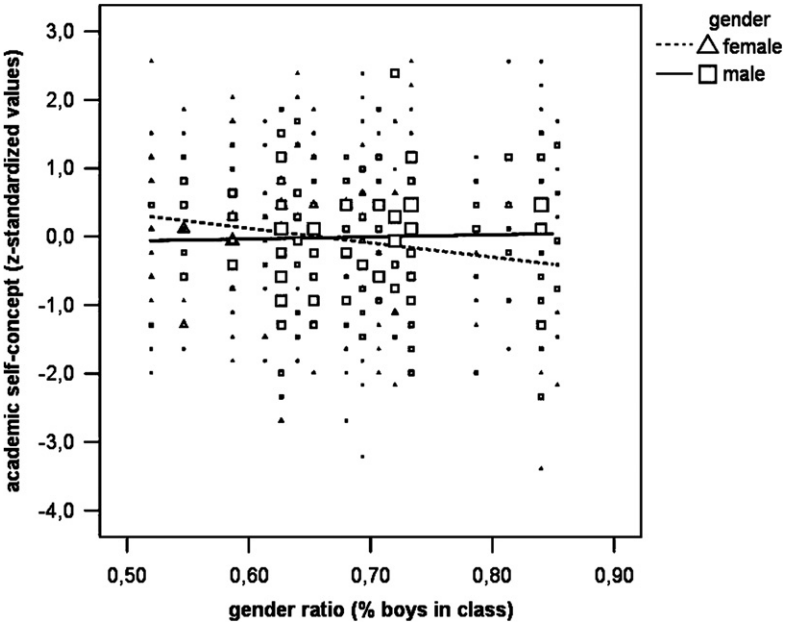

Fig. 1. Level of academic self-concept by gender-ratio depicted separately for boys and girls. *Notes:* The relative size of the signs indicates the number of students showing the corresponding combination of gender-ratio in class and academic self-concept; the bigger the sign the more students show the corresponding combination.

As hypothesized, no BFLPE was found for *social self-concept* (see Table 3). Social self-concept was positively related to individual achievement, but was not related to mean class achievement level (Table 3, Model 1). Adding both gender and gender-ratio into the predictor stock of the model did not change this finding. Both gender and gender-ratio showed no significant effects on social self-concept (Table 3, Model 2). The interaction term (gender × gender-ratio) was not statistically significant and did not change the pattern of results found in Model 2 (Table 3, Model 3). We expected that the relationship between achievement and social self-concept was mediated by academic self-concept and our results supported this hypothesis: When adding academic self-concept to the analysis there was a strong mediation effect (Table 3, Model 4). Academic self-concept showed a strong positive effect on social self-concept ($\beta = 0.40$). When controlling for this effect, the relationship between individual achievement and social self-concept not only vanished but even became negative. This result indicated that when controlling for academic self-concept and gender, individual achievement level bears a negative effect on students' social self-concept.

7. Discussion

The present study investigated the effects of achievement and gender-ratio on gifted students' academic and social self-concept. Based on social comparison theory, we expected negative correlations between achievement of the reference group and students' academic self-concept when statistically controlling for individual achievement (big-fish-little-pond effect; BFLPE). Former studies that investigated the BFLPE for gifted students used educational contexts (e.g., special gifted classes versus regular mixed-ability classes) to operationally define ability level of the reference group. The BFLPE has not yet been documented exclusively within the gifted group or within special gifted classes, taking the respective achievement level of the class into account. Thus, the primary contribution of this study was to test the tenability of the BFLPE *within* special gifted classes. For social self-concept, no BFLPE was expected. Furthermore, we assumed that the relationship between social self-concept and achievement was mediated by academic self-concept.

A further aim of this study was the investigation of the influence of gender-ratio in gifted classes on academic self-perceptions. Little is known about possible factors that might moderate the extent to which the BFLPE affects individuals or certain subgroups of students. We assumed that gender-ratio in class would affect girls' and boys' academic self-perceptions differentially. Again, with reference to social comparison theory, we expected that gender-ratio has a negative influence on females' academic self-perceptions but not on males' academic self-perceptions. To our knowledge the influence of gender-ratio on students' academic self-concept in special gifted classes has not been studied before. Moreover, we investigated gender differences in academic self-concept and achievement. Ability grouping has been shown to have a more positive effect for highly able girls that for highly able boys. Moreover, girls in special gifted classes can be assumed to be a very able group. Therefore, we expected no gender differences in academic self-concept for students in special gifted classes.

7.1. Big-fish-little-pond effect

Using HLM, the BFLPE for academic self-perceptions was replicated within special gifted classes: Individual achievement was positively related to academic self-concept. Achievement of the reference group was negatively related to academic self-concept when controlling for

the effect at the individual level. Compared with the effect sizes found in other studies, with unselected students in heterogeneous classrooms, the effect size of mean class achievement on academic self-concept was of comparable size (in a comparison study of 26 countries, Marsh & Hau (2003) found a mean effect size of −0.21, compared to an effect size of −0.22 in the present study). The replication of the BFLPE within special gifted classes indicates that for students of very high ability, the achievement level of the reference group also plays a crucial role in the formation of academic self-perceptions. In other words, there seems to be nothing like a threshold for the BFLPE. In the present study, achievement level of the reference group was operationally defined by school grades. It turned out that level of achievement was sufficiently variable in various gifted classes to allow for reference group effects.

Studies have investigated various possibilities to counter the negative effects of social comparisons on academic self-perceptions. One promising approach is to have teachers use individual frames of reference when providing students with achievement-related feedback (instead of a social or achievement-criteria related frame of reference). Such an individual frame of reference employed by teachers, has been found to have positive effects on students' academic self-perceptions, along with a variety of cognitive, motivational, and affective variables on a class level (Köller, 2004). It might be assumed that an individual frame of reference can reduce the negative effect of an increasing level of class achievement on individual academic self-concept by reducing the amount of students' comparisons of individual achievement outcomes with those of other students in class.

As expected, the BFLPE did not hold for social self-concept. The gifted students' perception of their social competence was unaffected by achievement level of the reference group. However, we did find a small positive correlation with individual achievement that indicated that students who earn better grades also give high ratings for their social standing. Individual achievement and social self-concept are typically found to be negligibly correlated and we hypothesized that the weak positive relation between achievement and social self-concept found in our study was mediated by academic self-concept. Using HLM, we found support for this hypothesis. However, when controlling for academic self-concept and gender, the correlation between individual achievement and social self-concept not only vanished but even became negative. This unexpected finding suggests that for gifted students of comparable academic self-concept, social self-concept decreases with increasing individual achievement levels.

A number of explanations may be offered for the foregoing observation. First, low social self-concept scores could reflect higher levels of social conflict. It is not implausible that gifted students—even when attending special gifted classes—pay a greater social cost in terms of negative stereotyping, labeling, and social exclusion, the more they stand out in their achievements (Coleman & Cross, 2000). On the other hand, lower social self-concept scores, when accompanied by higher achievements, could reflect the social-emotional experience of being different, particularly among the brilliantly gifted (Morelock & Feldman, 2003). Unfortunately, the present study does not allow us to shed light on why higher achieving gifted students with similar levels of academic self-concept show a lower social self-concept. Further research is needed to address this intriguing issue.

7.2. Gender differences and gender-ratio

Females, in fact, tend to be the minority in many programs for the gifted, although there is little reason to believe a priori that giftedness is distributed differentially across gender

groups. We argued that various hurdles may be responsible for this fact, including characteristics of the selection procedure. In the present study, the selection procedure (four steps: scholastic aptitude screening test, teacher nominations, advanced placement test, decision for or against gifted class carried out by parents and student) led to an unbalanced gender group distribution of approximately 70% males and 30% females. We assumed that those girls who made it into special gifted classes were a very able group; accordingly, gifted girls in this study were observed to earn higher grades than their gifted boy counterparts. Although it has been documented that gifted girls as compared to gifted boys, show less confidence in their achievement potential (Kerr & Nicpon, 2003; for research on gender differences in self-concept see Marsh, 1989; Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2006), this might not be valid for those gifted girls who choose to participate in selective gifted programs.

In addition, attending a special class for the gifted might lead to a stronger assimilation effect for girls than for boys. Accordingly, no gender differences in mean values for academic self-concept were found. However, when controlling for individual achievement and mean achievement of the reference group, we found gender differences in academic self-concept. The HLM analysis demonstrates that for gifted girls and boys who earned similar school grades and are also parts of classes of similar achievement level, gifted girls reported lower levels of academic self-concept. Stated differently, females in the gifted classes earned better grades than males, but both genders reported a comparable mean level of academic self-concept. This finding could be interpreted as a strong BFLPE for gifted girls. Since students usually prefer same-sex comparisons, girls in special gifted classes as compared to gifted boys relate to a higher achieving reference group. Unfortunately, no social comparison measures were included into the presented study. Thus, we do not have direct evidence for our interpretations. Further research is needed to shed more light on the mechanisms of social comparisons associated with gender differences in academic self-perceptions in the context of ability grouping. Of note, our findings suggest that for the study of gender differences in academic self-concept, comparisons of group means might not be sufficient: gender differences in self-concept only become detectable when controlling for individual, as well as class achievement.

As expected, gender-ratio in gifted classes was found to have a negative effect on gifted females' academic self-concept. With an increasing number of boys in class, the reported academic self-concept of girls decreased. Research on single sex-education showed that in male sex-typed domains like physics or mathematics single sex-education can be profitable for the girls' academic self-concept (Hannover & Kessels, 2002; Stables, 1990). However, results on single-sex education on academic self-concept are by no means consistent. For example, Rost and Pruisken (2000) when studying the effects of coeducation versus single-sex schooling in all school subjects found no effects of coeducation versus single-sex education. In addition, in the data set of the present study, all groups comprised more males than females so that gender and minority status were confounded. Thus, further research is needed in which gender-ratio in class is systematically varied to disentangle the influence of gender and minority status before making statements about causal relations. Moreover, with respect to generalizability of findings gifted classes in other social or cultural contexts as well as unselected, regular mixed-ability classes should be taken into account.

Based on the present findings, it would be premature to suggest specific guidelines for forming special gifted classes with respect to gender-ratio. In addition, the effect sizes of gender and gender-ratio for explaining academic self-concept were rather small when com-

pared to the effect sizes for individual achievement or class achievement. Notwithstanding, the significant interaction of gender and gender-ratio in explaining academic self-concept in special gifted classes might add to our understanding of differential effects (individual and subgroup differences) of ability grouping. The investigation of such factors is of high practical concern (Marsh, Hau, & Craven, 2004) and we hope that our findings do initiate further research. With respect to our findings on the BFLPE, there is a vast body of empirical findings that supports the generalizability of the BFLPE to various educational settings and cultural contexts (see Section 2.1). Thus, it seems likely that the BFLPE can also be replicated within the gifted group in other social or cultural contexts.

In sum, the present study replicated the BFLPE for academic self-concept within special gifted classes. Furthermore, this effect was demonstrated among gifted children when both individual and class variance was taken into consideration in the HLM. The BFLPE was not evidenced for social self-concept. Also, gender-ratio in gifted classes was found to have a negative effect on gifted girls' academic self-concept, whereas gender-ratio had no influence on boys' academic self-concept. It is plausible that with increasing minority status (i.e., smaller percentage of girls in class), gender stereotypes might be increasingly influential in the formation of negative academic self-perceptions, evidenced in the lower academic self-concept scores in female students. Future research might systematically vary class gender-ratio and take account of unselected, mixed-ability classes before deducing practical implications for the education of the gifted.

References

Ablard, K. (1997). Self-perceptions and needs as a function of type of academic ability and gender. *Roeper Review, 20*, 110–115.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Parc, CA: Sage.

Bennett, M. (2000). Correlations between self-estimated and psychometrically measured IQ. *Journal of Social Psychology, 139*, 405–410.

Berndt, T. J., & Burgy, L. (1996). Social self-concept. In B. A. Bracken (Ed.), *Handbook of self-concept: Developmental, social, and clinical considerations* (pp. 171–209). Oxford, UK: Wiley.

Blanton, H., Buunk, B. P., Gibbons, F. X., & Kuyper, H. (1999). When better-than-others compare upward: Choice of comparison and comparative evaluation as independent predictors of academic performance. *Journal of Personality and Social Psychology, 76*, 420–430.

Bracken, B. A. (1992). *Multidimensional Self-Concept Scale*. Austin, TX: Pro-ed.

Busse, T. V., Dahme, G., & Wieczerkowski, W. (1986). Teacher perceptions of highly gifted students in the United States and West Germany. *Gifted Child Quarterly, 30*, 55–60.

Byrne, B. M., & Shavelson, R. J. (1996). On the structure of social self-concept for pre-, early, and late adolescents: A test of the Shavelson, Hubner, and Stanton (1976) model. *Journal of Personality and Social Psychology, 70*, 599–613.

Carter, R., & Wojtkiewicz, R. A. (2000). Parental involvement with adolescents' education: Do daughters or sons get more help? *Adolescence, 35*, 29–44.

Catsambis, S., Mulkey, L. M., & Crain, R. L. (1999). To track or not to track? The social effects of gender and middle school tracking. *Research in Sociology of Education and Socialization, 12*, 135–163.

Catsambis, S., Mulkey, L. M., & Crain, R. L. (2001). For better or for worse? A nationwide study of the social psychological effects of gender and ability grouping in mathematics. *Social Psychology of Education, 5*, 83–115.

Cialdini, R. B., Borden, R. J., Thorne, A., Walker, M. R., Freeman, S., & Sloan, L. R. (1976). Basking in reflected glory: Three (football) field studies. *Journal of Personality and Social Psychology, 34*, 366–375.

Coleman, L. J., & Cross, T. L. (2000). Social-emotional development and the personal experience of giftedness. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd. ed., pp. 203–212). Oxford, UK: Pergamon.

Craven, R. G., Marsh, H. W., & Print, M. (2000). Gifted, streamed, and mixed-ability programs for gifted students: Impact on self-concept, motivation, and achievement. *Australian Journal of Education, 44*, 51–75.

Dai, D. Y. (2001). A comparison of gender differences in academic self-concept and motivation between high-ability and average Chinese adolescents. *Journal of Secondary Gifted Education, 13*, 22–32.

Dai, D. Y. (2004). How universal is the Big-Fish-Little-Pond Effect? *American Psychologist, 59*, 267–268.

Feldhusen, J. F., & Jarvan, F. A. (2000). Identification of gifted and talented youth for educational programs. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 233–252). Oxford, UK: Pergamon.

Felson, R. B., & Reed, M. D. (1986). Reference groups and self-appraisals of academic ability and performance. *Social Psychology Quarterly, 49*, 103–109.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140.

Freeman, J. (2004). Cultural influences on gifted gender achievement. *High Ability Studies, 15*, 7–23.

Gagné, F. (1993). Sex differences in the aptitude and talents of children as judged by peers and teachers. *Gifted Child Quarterly, 37*, 69–77.

Hannover, B., & Kessels, U. (2002). Monoedukativer Anfangsunterricht in Physik in der Gesamtschule: Auswirkungen auf Motivation, Selbstkonzept und Einteilung in Grund- oder Fortgeschrittenenkurse [Physics in single-sex or mixed teaching groups. Impact on motivation, self-concept of abilities, and course enrollment of 8th grade comprehensive school students]. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie, 34*, 201–215.

Herbert, J., & Stipek, D. (2005). The emergence of gender differences in children's perceptions of their academic competence. *Journal of Applied Developmental Psychology, 26*, 276–295.

Holling, H., & Preckel, F. (2005). Self-estimation of intelligence: Methodological approaches and gender differences. *Personality and Individual Differences, 38*, 503–517.

Kelly, K. R., & Jordan, L. K. (1990). Effects of academic achievement and gender on academic and social self-concept: A replication study. *Journal of Counseling and Development, 69*, 173–177.

Kerr, B. A. (1997). *Smart girls: A new psychology of girls, women and giftedness*. Scottsdale, AZ: Gifted Psychology Press (Revised edition).

Kerr, B. A., & Nicpon, M. F. (2003). Gender and giftedness. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 493–505). Boston: Allyn Bacon.

Köller, O. (2004). *Konsequenzen von Leistungsgruppierungen* [Effects of ability grouping]. Münster; Germany: Waxmann.

Lips, H. M. (2004). The gender gap in possible selves: Divergence of academic self-views among high school and university students. *Sex Roles, 50*, 357–371.

Lubinski, D., & Benbow, C. P. (1992). Gender differences in abilities and preferences among the gifted: Implications for the math/science pipeline. *Current Directions in Psychological Science, 1*, 61–66.

Lubinski, D., Benbow, C. P., & Morelock, M. (2000). Gender differences in engineering and the physical sciences among the gifted: An inorganic–organic distinction. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 633–648). Oxford, UK: Pergamon.

Major, B., & Forcey, B. (1985). Social comparisons and pay evaluations: Preferences for same-sex and same-job wage comparisons. *Journal of Experimental Social Psychology, 21*, 393–405.

Markus, H., & Wurf, E. (1987). The dynamic self-concept. A social psychological perspective. *Annual Review of Psychology, 38*, 299–337.

Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. *Journal of Educational Psychology, 79*, 280–295.

Marsh, H. W. (1989). Age and sex effects in multiple dimensions of self-concept: Preadolescence to early-adulthood. *Journal of Educational Psychology, 81*, 417–430.

Marsh, H. W. (1990). *Self-Description Questionnaire-II*. San Antonio, TX: Psychological Corporation.

Marsh, H. W. (1994). Using the National Longitudinal Study of 1988 to evaluate theoretical models of self-concept: The Self-Description Questionnaire. *Journal of Educational Psychology, 86*, 439–456.

Marsh, H. W. (2005). Big-fish-little-pond effect on academic self-concept. *German Journal of Educational Psychology, 19*, 119–127.

Marsh, H. W., Chessor, D., Craven, R., & Roche, L. (1995). The effect of gifted and talented programs on academic self-concept: The big fish strikes again. *American Educational Research Journal, 32*, 285–319.

Marsh, H. W., & Craven, R. (2002). The pivotal role of frames of reference in academic self-concept formation: The big-fish-little-pond effect. In F. Pajares & T. Urdan (Eds.), *Adolescence and education* (Vol. 2, pp. 83–123). Greenwich, CT: Information Age..

Marsh, H. W., & Hau, K. T. (2003). Big-fish-little-pond effect on academic self-concept: A Cross-cultural (26-country) test of the negative effects of academically selective schools. *American Psychologist, 58*, 364–376.

Marsh, H. W., Hau, K. T., & Craven, R. (2004). The big-fish-little-pond effect stands up to scrutiny. *American Psychologist, 59*, 269–271.

Marsh, H. W., Kong, C. K., & Hau, K. T. (2000). Longitudinal multilevel models of the big-fish-little-pond effect on academic self-concept: Counterbalancing contrast and reflected-glory effects in Hong Kong. *Journal of Personality and Social Psychology, 78*, 337–349.

Marsh, H. W., & Parker, J. W. (1984). Determinants of self-concept: Is it better to be a relatively large fish in a small pond even if you don't learn to swim as well. *Journal of Personality and Social Psychology, 47*, 213–231.

Marsh, H. W., & Rowe, K. J. (1996). The negative effects of school-average ability on academic self-concept—an application of multilevel modelling. *Australian Journal of Education, 40*, 65–87.

Marsh, H. W., Trautwein, U., Lüdtke, O., Köller, O., & Baumert, J. (2006). Integration of multidimensional self-concept and core personality constructs: Construct validation and relations to well-being and achievement. *Journal of Personality, 74*, 403–456.

McCoach, D. B., & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high-achieving gifted students. *Gifted Child Quarterly, 47*, 144–154.

McFarland, C., & Buehler, R. (1995). Collective self-esteem as a moderator of the frog-pond effect in reactions to performance feedback. *Journal of Personality and Social Psychology, 68*, 1055–1070.

McGuire, W. J., & McGuire, C. V. (1988). Context and process in the experience of self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 97–144). New York: Academic Press.

Möller, J., & Köller, O. (1998). Leistungs- und geschlechtsbezogene Vergleiche in der Schule [Achievement and gender related comparisons in school]. *Empirische Pädagogik, 12*, 119–131.

Morelock, M. J., & Feldman, D. H. (2003). Extreme precocity: Prodigies, savants, and children of extraordinarily high IQ. In N. Coleangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 455–469). Boston: Allyn and Bacon.

Muller, C. (1998). Gender differences in parental involvement and adolescents' mathematics achievement. *Sociology of Education, 71*, 336–356.

Plucker, J. A., Robinson, N. M., Greenspon, T. S., Feldhusen, J. F., McCoach, D. B., & Subotnik, R. F. (2004). It's not how the pond makes you feel, but rather how high you can jump. *American Psychologist, 59*, 268–269.

Rammstedt, B., & Rammsayer, T. H. (2000). Sex differences in self-estimates of different aspects of intelligence. *Personality and Individual Differences, 29*, 869–880.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models. Applications and data analysis methods* (2nd ed.). Thousand Oaks: Sage Publications.

Raudenbush, S., Bryk, A., Cheong, Y. F., & Congdon, R. (2001). *HLM™5. Hierarchical linear and nonlinear modeling*. Lincolnwood: Scientific Software International.

Reis, S. M. (1998). *Work left undone: Compromises and challenges of talented females*. Mansfield Center, CT: Creative Learning Press.

Rindermann, H., & Heller, K. A. (2005). The benefit of gifted classes and talent schools for developing students' competences and enhancing academic self-concept. *German Journal of Educational Psychology, 19*, 133–136.

Rost, D. H., & Pruisken, C. (2000). Vereint schwach? Getrennt stark? Mädchen und Koedukation. [Together Weak? Separated strong? Girls and coeducation]. *German Journal of Educational Psychology, 14*, 177–193.

Shavelson, R., Huber, J., & Stanton, G. (1976). Self-concept: Validation and construct interpretation. *Review of Educational Research, 46*, 407–441.

Shields, C. M. (2002). A comparison study of student attitudes and perceptions in homogeneous and heterogeneous classrooms. *Roeper Review, 24*, 115–119.

Smith, H. J., & Leach, C. W. (2004). Group membership and everyday social comparison experiences. *European Journal of Social Psychology, 34*, 297–308.

Stables, A. (1990). Differences between pupils from mixed and single-sex schools in their enjoyment of school subjects and in their attitudes to science and to school. *Educational Review, 42*, 221–230.

Suls, J. M., Gaes, G., & Gastorf, J. (1979). Evaluating a sex-related ability: Comparison with same- opposite-, and combined-sex norms. *Journal of Research in Personality, 13*, 294–304.

Wentzel, K. R., & Erdley, C. A. (1993). Strategies for making friends: Relations to social behavior and peer acceptance in early adolescence. *Developmental Psychology, 29*, 819–826.

Wheeler, L., Martin, R., & Suls, J. M. (1997). The proxy model of social comparison for self-assessment of ability. *Personality and Social Psychology Review, 1*, 54–61.

Wheeler, L., & Miyake, K. (1992). Social comparison in everyday life. *Journal of Personality and Social Psychology, 62*, 760–773.

Zeidner, M. (1995). Hebrew version of Bracken's multidimensional self-concept scale (Experimental edition). University of Haifa, Israel: Author.

Zeidner, M., & Schleyer, E. J. (1999a). The big-fish-little-pond effect for academic self concept, test anxiety, and school grades in gifted children. *Contemporary Educational Psychology, 24*, 305–329.

Zeidner, M., & Schleyer, E. J. (1999b). Test anxiety in intellectually gifted school students. *Anxiety, Stress, and Coping: An International Journal, 12*, 163–189.

Zeidner, M., & Schleyer, E. J. (1999c). Evaluating the effects of full-time vs. part-time educational programs for the gifted: affective outcomes and policy considerations. *Evaluation and Program Planning, 22*, 413–427.

Zeidner, M., & Schleyer, E. J. (1999d). The effects of educational context on individual differences variables, self-perceptions of giftedness, and school attitudes in gifted adolescents. *Journal of Youth and Adolescence, 28*, 687–703.