University of Groningen

A further examination of the big-fish-little-pond effect

Thijs, J.T.; Verkuyten, M.J.A.M.; Helmond, P.E.

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
Thijs, J. T., Verkuyten, M. J. A. M., & Helmond, P. E. (2010). A further examination of the big-fish-little-pond effect: perceived position in class, class size, and gender comparisons. *Sociology of Education*, *83*(4), 333-345. https://doi.org/10.1177/0038040710383521

Sociology of Education

http://soe.sagepub.com/

Published by:

$\bigcirc$SAGE

http://www.sagepublications.com

On behalf of:

American Sociological Association

Additional services and information for *Sociology of Education* can be found at:

Email Alerts: http://soe.sagepub.com/cgi/alerts

Subscriptions: http://soe.sagepub.com/subscriptions

Reprints: http://www.sagepub.com/journalsReprints.nav

Permissions: http://www.sagepub.com/journalsPermissions.nav

>> Version of Record - Oct 26, 2010

What is This?

A Further Examination of the Big-Fish–Little-Pond Effect: Perceived Position in Class, Class Size, and Gender Comparisons

Jochem Thijs[1], Maykel Verkuyten[1], and Petra Helmond[1]

Abstract

Among early adolescents (10–12 years) in the Netherlands, this study examined the academic self-concept in terms of the big-fish–little-pond effect (BFLPE). The BFLPE implies that students in classes where the average achievement is low will have a higher academic self-concept than equally achieving students in classes where the average achievement is high. The social comparison process assumed to underlie this effect was examined by focusing on classmates' average achievement and the perceived relative achievement position in the school class. It was found that the perceived class position mediated the relationship between classmates' achievement and the academic self-concept. In addition, the effect of classmates' achievement on perceived relative academic position was stronger in smaller compared to larger classes. Furthermore, it was investigated whether classmates' gender was differently important for social comparison processes in the academic domain. It turned out that students' academic self-concept was affected by the achievements of same-gender classmates. Achievements of opposite-gender classmates only had an effect on the academic self-concept when the number of these classmates was small. The findings of this study support the theoretical principles underlying the big-fish–little-pond effect and are relevant for debates about class sizes and the utility of academic selective schooling.

Keywords

Big-fish–little-pond-effect, social comparison, perceived class position, class size, gender

The development of a positive academic self-concept is an important educational goal. The academic self is considered a key construct in various motivational and self-concept theories and has been extensively studied in relation to school structure and to future academic achievement (e.g., Marsh and Craven 2006; Rosenberg et al. 1995; Ross and Broh 2000). Children form beliefs and evaluations about their academic abilities through experiences with and interpretations of their school environment. In understanding the development of the academic self, Marsh (1987) has proposed the idea of the big-fish–little-pond effect (BFLPE) by applying social comparison theory (Festinger 1954) to an educational setting. Theoretically, it is argued that "students compare

[1]Utrecht University, Utrecht, The Netherlands

Corresponding Author:
Jochem Thijs, Department of Interdisciplinary Social Science, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, the Netherlands
Email: j.t.thijs@uu.nl

their own academic achievement with the academic achievement of their peers and use this social comparison impression as one basis for forming their own academic self-concept" (Marsh and Hau 2003:367). Thus, the same objective accomplishments can lead to different self-concepts depending on the standards of comparison or frame of reference that students use to evaluate themselves.

The present study examined the BFLPE in a sample of early adolescents in Dutch primary education. We tried to contribute to the literature in three ways. First, we examined more closely the social comparison process underlying the BFLPE. Social comparison involves perceptions and interpretations of self-relevant information. However, research on the BFLPE has not examined empirically the key process of *perceived* relative academic achievement. Existing research has typically focused on class or school average achievement levels and how these relate to students' academic self-concept. In line with the social comparison principle underlying the BFLPE, this relationship is assumed to be mediated by students' perceptions of their own achievement relative to their classmates. Second, we went beyond previous research by taking class size into account. Sociological research has examined the relationship between class size and the self-concept (see Townsend 2007), but to our knowledge little attention has been paid to the question whether the BFLPE is a function of class size. Third, we examined to what extent students compare their academic achievements along gender lines. Although there is work on the differential susceptibility to reference group effects among female versus male students (e.g., Catsambis, Mulkey, and Crain 1999, 2001; Preckel et al. 2008), it is unclear whether the BFLPE is restricted to same-gender comparisons.

The Big-Fish–Little-Pond Effect

The BFLPE implies that academic self-concept depends not only on one's own academic accomplishments but also on how students think that they perform academically in comparison to fellow students in their classroom or school. Individual achievement has a positive effect on academic self-concept. However, equally achieving students will have a higher academic self-concept in classes (or schools) where the average achievement is low and a lower academic

self-concept in classes (or schools) where the average achievement is high. Thus, there is a negative influence of average class (or school) achievement when the effect of individual achievement is partialled out (Marsh et al. 2008).

Various studies have examined and supported the BFLPE (e.g., Espenshade, Hale, and Chung 2005; Marsh, Kong, and Hau 2000; Tymms 2001; Zeidner and Schleyer 1998) and confirmed its cross-cultural generalizability (Marsh and Hau 2003; Seaton et al. 2008). These studies have shown that academic self-concept can be affected negatively by the average achievement of fellow students. However, to our knowledge, there is no explicit evidence that this reference effect is indeed due to social comparison processes. As noted by Dai and Rinn (2008), social comparison is assumed but not directly examined in the BFLPE literature. Theoretically, the effect of class average achievement on academic self-concept should be mediated by the *perception* of one's academic achievement relative to one's classmates. For example, a student may have a rather low academic self-concept because she thinks that her achievements are lower than her classmates, and she has this idea because of her peers' academic achievement levels.

In the present study, we examined whether the BFLPE can be statistically explained by students' perceptions of their academic achievement relative to their classmates. To assess these perceptions, students were asked to rate their academic position on a scale ranging from the worst performing to the best performing student in their class. Figure 1 shows the hypothesized model. Note that we did not examine the class reference effect by testing the impact of the class average achievement. Instead, we evaluated the average achievement of students' *classmates* because it is methodologically more appropriate to exclude individual students from their own reference group (see Dai and Rinn 2008). We expected that classmates' achievement will have a unique negative effect on academic self-concept that is mediated by perceived relative academic position. Individual achievement was also assumed to have a positive independent effect because self-evaluations are not solely based upon comparisons with classmates (see Harter 1999; Rosenberg et al. 1995).

Students use multiple frames of reference for making self-judgments, such as school average achievement, class average achievement, selected students in class, and selected students outside
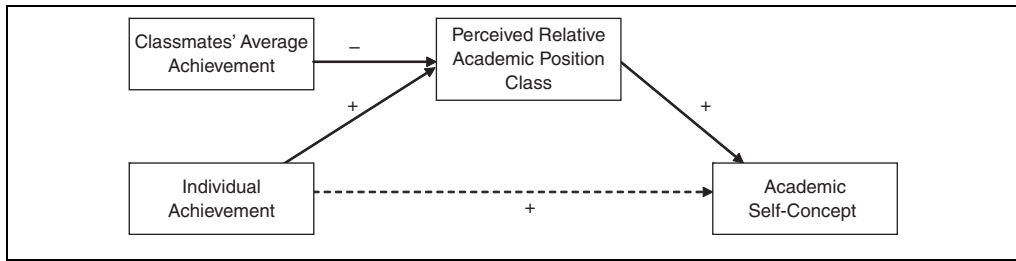
Figure 1. The big-fish–little-pond effect as examined in the present study

class (Skaalvik and Skaalvik 2002). Tests of the BFLPE have typically examined the class (or school) average as a standard of comparison. The present study went beyond previous research by also examining the roles of class size and gender referent group.

Social Comparison and Class Size

According to Dai and Rinn (2008:297), previous research has lacked a "specification of contexts where the BFLPE is more likely or less likely to occur" (but see Marsh et al. 2008). The number of children in each classroom may be an important contextual characteristic that has been neglected in earlier investigations. There are two main reasons to expect that class size decreases students' susceptibility to the reference effect. First, for the BFLPE to occur, individual students should have accurate information about the accomplishments of all classmates. This is probably more difficult in large versus small classes. Thus, students in larger classes may be less affected by classmates' actual mean achievement, simply because they are less aware of it.

A second reason is that larger classes provide more opportunities for *individual* upward social comparisons. According to social comparison theory (Festinger 1954), people are motivated to compare their own accomplishments with those of others that do a little better than themselves. Unlike comparisons with all other classmates, individual upward comparisons are self-chosen (Seaton et al. 2008; Skaalvik and Skaalvik 2002). Moreover, these comparisons encourage people to improve themselves and may have positive effects on their self-concepts and achievements. Recently, Seaton and colleagues (2008) provided evidence for the (independent) coexistence of the BPLPE and the impact of

comparisons with the achievement of a *single*, slightly better, self-chosen classmate. Yet, their findings do not rule out the possibility that class size reduces students' dependency on comparisons with *all* classmates (the BFLPE) by increasing the opportunity for *more* self-chosen individual comparisons.

Gender Referent Groups

Sociological research has shown that individual academic decisions are affected by general beliefs about gender differences in academic abilities (Corell 2001) and that female students are more oriented toward the academic achievements of their own gender friends (Riegle-Crumb, Farkas, and Muller 2006). Still, there have been no studies examining whether the BFLPE applies more to same- versus opposite-gender referent groups in the classroom. There are theoretical reasons to expect that the BLPE predominantly depends on gender in-group comparisons. First, gender is an important social category in childhood and adolescence (Maccoby 1988). Because people tend to have a stronger emotional bond with in-group members (McPherson, Smith-Lovin, and Cook 2001) and tend to define their abilities in relation to standards of their own group (Rosenberg 1979), social comparisons with gender in-group students are likely to have a greater impact on early adolescents' self-evaluations than comparisons with gender out-group students.

In addition, people tend to compare themselves with others whom they perceive to be rather similar in attributes or performance level (Goethals and Darley 1977). To our knowledge, no consistent gender differences have been found for overall academic achievement. However, there is consensus that females tend to perform better on verbal tasks and that males tend to do slightly

better on mathematical tasks and that there are corresponding differences in domain-specific academic self-evaluations (for reviews, see Jacobs et al. 2002; Nowell and Hedges 1998). Thus, same-gender students are probably seen as being more similar in educational achievements and therefore as providing more informative social comparison standards. This means that we can expect that students' academic self-concept will be affected more strongly by the achievement of gender in-group than of gender out-group classmates.

Research Goals

In summary, the goals of this research are three-fold. First, we test the core idea of the BFLPE, namely, that the effect of the class average achievement on academic self-concept is mediated by perceived achievement relative to one's classmates. Second, we investigate the moderating role of class size, expecting that the BFLPE is stronger in smaller classes. Third, we examine the unique effects of the average achievement of gender referent groups in the classroom. More specifically, we evaluate the hypothesis that students' academic self-concept is affected more strongly by the achievements of gender in-group versus gender out-group classmates. Furthermore, the achievement of gender out-group classmates is expected to only have an effect when the number of these classmates is relatively small.

DATA AND METHOD

Participants and Procedure

For the research, a random sample of 200 schools from the national list of primary schools in the Netherlands was approached. In total, 65 schools agreed to participate. These schools were located in 30 different cities representing all regions in the Netherlands. The students were presented with a short questionnaire that they completed in the classroom. Participation in the study was voluntary and none of the students refused to participate. For this study, only the students in the highest grade in primary school were selected since important explanatory variables were only available for them. In addition, one class with 11 students was excluded as all of them were boys, and 4 students were not included as their gender was unknown. The final sample consisted

of 1,649 students (804 boys and 845 girls; M_{age} = 11.9 years) nested in 79 classes with a mean class size of 20.92 (SD = 5.03, range = 12–32). The students had various ethnic backgrounds. According to both their ethnic self-definition and the background of their parents, 746 students could be classified as Dutch. According to the same criteria, 455 children belonged to two of the largest minority groups in the Netherlands, namely, Turks (n = 253) and Moroccans (n = 202). The proportion of females in these classes ranged from 28.0 percent to 85.7 percent (M = 51.5, SD = 11.0).

There were no missing variables for 96 percent of the cases. For the remaining children, values were missing for one to five items (Mdn = 1). These scores were imputed employing the expectation maximization algorithm (EM). This procedure is adequate when values are missing at random (Bernaards and Sijtsma 1999).

Measures

Individual achievement was assessed by using students' self-reports of their official secondary educational advice. The secondary Dutch education system has five levels: (1) initial professional education, (2) general and vocational education, (3) senior general secondary education, (4) university preparatory education athenaeum, and (5) university preparatory education gymnasium (high level grammar school). Students receive their secondary education advice in the final grade of primary school. This advice involves one type of education or the combination of two bordering levels.[1] It is predominantly based on students' scores on the CITO-test, which is the standard national school achievement test, and the advice is found to be very highly correlated with these scores (r > .85; Driessen and Doesborgh 2005). The CITO-test scores were not available for our research. Our absolute achievement measure was a 7-point scale including each level and the combinations of levels 2 and 3 and levels 3 and 4.

Based on students' individual achievement scores, three new aggregated measures were created. To compute a measure for classmates' average achievement, we subtracted a student i's individual advice score (X_i) from the sum of all advice scores in his or her class ($\Sigma_{class} X_i$) and divided the difference by the number of classmates ($n_{class} - 1$). Likewise, the average achievement of

a students' gender in-group classmates (henceforth labeled as *gender in-group achievement*) was calculated by averaging the individual advice scores of classmates with the same gender, and the average advice of gender out-group classmates (*gender out-group achievement*) was calculated by taking the average of classmates with the opposite gender. Gender in-group and out-group achievements were positively related ($r = .48$, $p < .001$). Note that students' own achievement scores were not part of any of the aggregated measures. This was done to prevent collinearity between the individual and the aggregated achievement measures (see Dai and Rinn 2008).

The students' perceived relative academic position within the classroom was determined by three versions of the Willig scale (Burns 1979), a self-anchoring rating scale that has been used in previous studies among early adolescents in the Netherlands (Verkuyten, Thijs, and Canatan 2001). The scale consists of a flight of stairs with 11 steps. Students were informed that the highest step (10) and lowest step (0) marked, respectively, the best and the worst performing student in their classroom. Next, they were asked to tick the step that was most descriptive of their own academic performance. Thus, the higher the step students chose for themselves, the better their perceived relative academic position in the classroom. Participants used the scale to rate their general performance, achievement in the subject of language, and achievement in learning mathematics. These three ratings formed a reliable scale. Cronbach's alpha was 0.77 for this composite measure.

Academic self-concept was assessed by taking the mean score on four items adapted from Harter's (1985) well-known Self-perception Profile for Children. This measure has been examined and validated for children in the Netherlands (Van Rossum and Vermeer 1994). Participants are required to choose one statement from a pair of two opposite statements and subsequently to express their level of agreement with their choice. In the present study, students were presented with single statements rather than paired statements because in previous Dutch studies it was found that many children had difficulties with the paired format. Agreement with the items was rated on a scale ranging from *no, certainly not!* (1) to *yes, certainly!* (4). The following items were used: "Some children find it hard to complete their school tasks. How about you?" "Some children often forget

what they have learned in school. How about you?" "Some children think they are good at studying. How about you?" and "Some children find it hard to give a correct answer when the teacher asks a question. How about you?" Cronbach's alpha was 0.61.

To test whether the measures for perceived position in class and academic self-concept corresponded to two separate factors that were similar for male and female students, multiple group confirmatory factor analyses were conducted in AMOS 7.0 using maximum likelihood estimation (Arbuckle 2007). The Comparative Fit Index (CFI), the standardized root mean squared residual (SRMR), and the root mean square error of approximation (RMSEA) were inspected to evaluate model fit. A good fit of the model to the data is indicated by CFI values close to 0.95, SRMR values close to 0.08, and RMSEA values close to 0.06 (Hu and Bentler 1999). To compare the fit of nested models, the difference in χ^2 statistics was tested. First, we specified an unconstrained two-factor model without cross-loadings or error correlations. The fit of this model was satisfactory: $\chi^2(26) = 182.709$, $p < .001$; CFI = 0.947; SRMR = 0.055; and RMSEA = 0.060. Next, we examined whether factor loadings were similar for male and female students. Model fit did not change significantly when all but one loading were constrained to be equal across gender, $\chi^2(4) = 8.378$, $p > .05$. The noninvariant item was perceived (relative) language achievement. Its loading on perceived position was somewhat stronger for female than for male students (0.725 vs. 0.614). Hence, the cross-gender factorial invariance of the two-factor structure appeared to be almost complete (see Cheung and Rensvold 1998). The fit of the second model was satisfactory as well: $\chi^2(30) = 191.086$, $p < .001$; CFI = 0.946; SRMR = 0.054; and RMSEA = 0.057. Together, these analyses indicate that the measures for perceived position and academic self-concept reflect two separate constructs that were (almost) equivalent for students of each gender.

Mean scores and scale ranges for all measures are given in Table 1. Note that means but not ranges are similar for all achievement measures.

Analyses

The data used for this study have a hierarchical structure with students nested in classes. Hence, it was expected that the assumption of measurement

Table 1. Means and Scale Ranges

	M	SD	Range
Individual achievement	2.69	1.69	1.00 to 7.00
Classmates' achievement	2.69	0.61	1.25 to 4.32
Gender in-group achievement	2.69	0.72	1.00 to 5.14
Gender out-group achievement	2.69	0.70	1.20 to 4.62
Perceived position	6.65	1.57	0.00 to 10.00
Academic self-concept	2.97	0.51	1.00 to 4.00

independence was violated. Not controlling for nonindependency can lead to inflated standard errors (Snijders and Bosker 1999). To prevent this, our hypotheses were tested by means of multilevel analyses. These analyses were conducted with MLwiN version 2.0 (Rasbash et al. 2004) using the iterative generalized least squares algorithm. Two levels were specified: Level 1 pertaining to differences within classes and Level 2 pertaining to differences between classes.[2] In the analyses, the effects of individual student characteristics (gender, individual achievement, and perceived academic position) were initially fixed at Level 2. However, if this resulted in significant model improvement ($p < .05$), regression slopes were allowed to vary randomly across Level 2.

RESULTS

Preliminary Analyses

Prior to addressing our research goals, we standardized and inspected the scores for all continuous variables. For three variables (perceived academic position, academic self-concept, and gender in-group achievement), outliers (standardized values > 3.29 or $< –3.29$) were detected (see Tabachnick and Fidell 2001). To diminish the potential influence of these outliers, 10 scores were replaced with values less than 3.29 standard deviations removed from the mean: the four lowest scores on perceived academic position, the five lowest scores on academic self-concept, and the highest score for gender in-group achievement. For each measure, however, the rank order of all scores was retained (see Tabachnick and Fidell 2001).[3] For ease of interpretation, the three measures were standardized again after this operation.

Next, we calculated the intercorrelations of academic achievement, perceived academic position, and academic self-concept. Individual achievement showed positive relations with perceived academic position and academic self-concept ($r = .58$ and $r = .44$, respectively). In addition, the correlation between the latter two measures was also positive ($r = .52$, all $ps < .001$). This means that students who reported to perform well compared to their classmates positively evaluated their academic abilities.

Finally, we inspected the variance distributions of academic achievement, perceived academic position, and academic self-concept. The BFLPE requires systematic differences between classrooms in academic achievement, and it implies that the classroom differences for achievement are larger than the classroom differences for academic self-concept and perceived academic position.

To examine whether these features were present in our data, we tested so-called intercept-only multilevel models for the three (individual) academic measures. These models estimated the proportion of variance at Level 2 (between classrooms) for each dependent variable (Snijders and Bosker 1999). Results indicated that 8 percent of the total variance in individual achievement was at Level 2 ($p < .001$), implying that there were systematic differences between classes. For perceived academic position the Level 2 variance was smaller (2 percent, $p < .05$), and for academic self-concept it was nonsignificant.

BFLPE

Multilevel regression models tested the BFLPE in our sample. The BFLPE implies a negative influence of classmates' achievement once the impact of individual achievement is partialled out (Marsh et al. 2008). Hence, we regressed perceived academic position and academic self-concept on *both* individual achievement and classmates' average achievement while controlling for the influence of gender. Results are shown in Table 2 (under Model 1).

For both variables, there was a negative effect of gender. Compared to boys, girls reported lower perceived academic positions and weaker academic self-concepts. The statistical effect of students' own achievement was positive, and the effect of their classmates' achievement was negative. Thus, consistent with the BFLPE, students

Table 2. Effects of Classmates' Achievement on Perceived Relative Academic Position and Academic Self-Concept

	Perceived position		Academic self-concept	
	Model 1	Model 2	Model 1	Model 2
Predictors				
Girls	−.259***	−.260***	−.135**	−.035
Individual achievement	.619***	.623***	.454***	.208***
Classmates' achievement	−.200***	−.178***	−.088**	.002
Class size	—	−.082**	—	—
Classmates' Achievement × Class Size	—	.064*	—	—
Perceived academic position	—	—	—	.395***
Variance components				
Level 1: var(e_{ij})	.556	.556	.778	.683
Level 2: var(u_{0j})	.042	.029	.019	.013
Level 2: var(u_{1j})	.005	.006	—	.008
Level 2: cov(u_{0j}, u_{1j})[a]	−.020	−.017	—	−.013
Deviance	3,784.404	3,772.985	4,298.163	4,085.264

Note: All continuous measures were standardized.
a. u_{1j} denotes the slopes of individual achievement in the models for perceived position and the slopes of perceived position in the models for academic self-concept.
*$p < .05$. **$p < .01$. ***$p < .001$.

seemed to use their classmates as referents in assessing their own academic abilities.

Next, we examined whether these reference effects depend on the number of classmates. Class size and its interaction with classmates' average achievement were added as predictors to the regression equations. For students' academic self-concept, these additional predictors had no significant effects (not shown in Table 2). However, for students' perceived academic position, there were significant effects of class size and its interaction with classmates' average achievement. The first effect was negative, which indicates that students in larger classes had more negative perceptions of their relative academic accomplishments. To examine the interaction effect, simple slope analyses were conducted (see Aiken and West 1991). We computed the effect of classmates' achievement in large and small classes (respectively, one standard deviation above and one standard deviation below the mean). As expected, the reference effect was smaller in the former than the latter type of classes: $b = -.114$, $p < .01$ versus $b = -.243$, $p < .001$.

Finally, we examined whether the effect of classmates' achievement on students' academic

self-concept was mediated by their perceived academic position in class. Three preconditions are necessary for mediation to occur. The independent variable (classmates' achievement) should be a significant predictor first of the dependent variable (academic self-concept) and second of the proposed mediator (perceived academic position). Our previous analyses (Models 1 in Table 2) showed that both conditions were met. Third, the proposed mediator should be a significant predictor of the dependent variable as well. Mediation is present when the influence of the independent variable on the dependent variable is substantially reduced when the mediator is added as another predictor (Baron and Kenny 1986).

To examine the third precondition and to test for mediation, perceived position was included as an additional predictor in the equation for academic self-concept. The result is shown under Model 2 (Table 2). Perceived academic position had a positive statistical effect on students' academic self-concept. When this effect was partialled out, the effect of individual achievement was reduced, and the effect of classmates was no longer significant. Thus, and as expected, these findings indicate that the classmate reference

Table 3. Effects of Gender In-group and Out-group Achievement on Perceived Relative Academic Position and Academic Self-concept

Fixed effects	Perceived position			Academic self-concept		
	Model 1	Model 2	Model 1	Model 2	Model 3
Girls	−.261***	−.268***	−.142**	−.161***	−.058
Individual achievement	.619***	.624***	.454***	.456***	.210***
Gender in-group achievement	−.118***	−.110***	−.078**	−.074**	−.031
Gender out-group achievement	−.111***	−.097***	−.028	−.008	.036
N gender in-group classmates	—	−.081***	—	−.039	.008
N gender out-group classmates	—	−.032	—	−.038	−.013
Gender in-group: Achievement × N	—	.001	—	−.008	−.002
Gender out-group: Achievement × N	—	.052*	—	.066**	.047*
Perceived academic position	—	—	—	—	.392***
Variance components					
Level 1: var(e_{ij})	.556	.554	.777	.775	.680
Level 2: var(u_{0j})	.043	.031	.019	.015	.012
Level 2: var(u_{1j})[a]	.005	.006	—	—	.009
Level 2: cov(u_{0j}, u_{1j})	−.019	−.014	—	—	−.013
Deviance	3,786.695	3,771.779	4,295.913	4,285.6111	4,079.027

Note: All continuous measures were standardized.

a. u_{1j} denotes the slopes of individual achievement in the models for perceived position and the slopes of perceived position in the models for academic self-concept.

*$p < .05$. **$p < .01$. ***$p < .001$.

effect on students' academic self-concept was mediated by their perceived academic position in the class.

Gender Referent Groups

We examined to what extent gender in-group and out-group classmates function as referents for perceived academic position and academic self-concept. Three sets of analyses were conducted, similar to those in which all classmates were examined as a single referent group. First, perceived academic position and academic self-concept were regressed on students' gender, their own achievement, gender in-group achievement, and gender out-group achievement. As shown in Table 3 (Model 1), the achievements of gender in-group and out-group classmates had negative effects on students' perceived academic position. For academic self-concept, there was no reference effect for gender out-group achievement but there was a significant negative effect of gender in-group achievement (Table 3). Note that the latter was quite similar to the effect of classmates' achievement in Table 2 (Model 1).

Next, we examined whether these effects depend on the number of gender in-group and out-group classmates. These numbers and their interactions with the corresponding average achievements were included as additional predictors. The number of gender in-group classmates had a negative effect on students' perceived academic position, but it was unrelated to their academic self-concept. Moreover, for both dependent variables, there was a significant interaction between the number of gender out-group classmates and their average achievement. As expected, it turned out that gender out-group achievement had a significant impact when the number of out-group classmates was small (one standard deviation below the mean) but not when it was large (one standard deviation above the mean): respectively, $b = −.149$, $p < .001$ versus $b = −.045$, *ns* for perceived academic position and $b = −.074$, $p < .05$ versus $b = .058$, *ns* for academic self-concept.

Finally, we tested whether perceived academic position mediated the gender in-group reference effect on academic self-concept. As evident from Model 1 (Table 3), two of the preconditions for

meditation specified by Baron and Kenny (1986) were present (significant effects of the independent variable on the dependent variable and the proposed mediator). Model 3 in Table 3 shows that perceived position had a unique positive effect on academic self-concept (precondition 3) and also that the effect of gender on in-group achievement was no longer significant when this additional predictor was included. Thus, the effect of in-group classmates appeared to be mediated by perceived position as well (see Baron and Kenny 1986).

DISCUSSION

This study provides a further test of the big-fish–little-pond effect by examining the mediating role of perceived relative achievement, the moderating role of class size, and the effects of the average achievements of gender in-group and out-group classmates. Although the cross-sectional nature of our data does not warrant definite causal conclusions, the results are in agreement with our hypotheses and consistent with existing theoretical notions about social comparison processes in the classroom.

The first aim of our study was to test the underlying comparison process of the BFLPE. Students are thought to develop an academic self-concept by comparing their own achievements with the achievements of their classmates. Existing studies have examined the unique effect of school or class average achievement on the academic self-concept (see Marsh and Hau 2003). However, these studies have not addressed the role of students' perceived academic class position, which is central to the BFLPE. It is the relative performance that is expected to matter and it is the perception and interpretation of this performance that should mediate the negative association between classmates' average achievement and academic self-concept (see Figure 1). Our findings are consistent with this theoretical idea. We found that classmates' average academic achievement had a negative effect on students' academic self-concept once the influence of their individual achievement was partialled out. Moreover, this reference effect was mediated by students' perceived academic achievements relative to those of their classmates. These findings provide strong empirical support for the notion that social comparison processes are at the heart of the BFLPE.

The link between individual achievement and academic self-concept was reduced but still significant when differences in perceived academic position were held constant. Students use multiple frames of reference to infer their own abilities, and perceived performance relative to fellow students is one of them (Skaalvik and Skaalvik 2002). Student's actual level of achievement was related to their academic self-concept independently of their perceived relative accomplishments. This is consistent with the typical finding that the effect of individual achievement is larger than the class (or school) reference effect (see Marsh and Hau 2003).

The second aim of our study was to examine the moderating, and neglected, role of class size. We had two reasons to hypothesize that class size would diminish the BFLPE: Students would be less knowledgeable about the actual accomplishments of all classmates in larger classes, and these classes would diminish their dependency on class average comparisons by providing more opportunities for individual upward social comparisons. Our findings are consistent with the first reason. Class size decreased the effect of classmates' average achievement on students' perceived academic position but *not* on their academic self-concept (i.e., the actual BFLPE). Thus, it appears that class size diminishes the *accuracy* of students' perceptions of their relative academic standing but not the *importance* of this perceived standing for their academic self-concept. Next, although class size reduced the negative reference effect of classmates' achievement, its main effect on students' perceived academic position was negative. Thus, our findings add to the ongoing debate about the pros and cons of small versus large classes (e.g., Borland, Howsen, and Trawick 2005) by showing that the effect of class size is diverse.

Our third aim was to investigate whether classmates' gender is differently important for social comparison processes in the academic domain. Both gender groups affected students' perceived academic position, which is not surprising as this measure involved comparisons with all fellow students. Yet, as expected, students' academic self-concept appeared to be affected stronger by the achievements of gender in-group than out-group classmates and this effect was mediated by perceived academic position. This is consistent with the idea that gender in-group classmates are perceived to be similar on achievement-related

attributes. The impact of the own gender group was independent of its size, which further attests to its great significance in late childhood (see Maccoby 1988).

In addition, our analyses revealed a significant impact of gender out-group achievement on academic self-concept in interaction with the number of gender out-group classmates. Only when this number was small, a negative reference effect was found. The absence of a main effect for the gender out-group is important as it suggests that not all classmates are equally involved in the BFLPE. Thus, it seems that the BFLPE, as obtained in the present study, is predominantly a consequence of gender in-group comparisons.

Furthermore, additional analyses (not reported in the text) showed that the role of the gender in-group was similar for boys and for girls. Thus, there was no evidence that, for example, same-gender students are more important for the academic self-concept of girls than for boys. However, there was a clear overall gender difference with boys having a more positive academic self than girls. This is in agreement with many other studies on gender differences in the self-concept (see Kling et al. 1999).

The present findings suggest at least two important directions for future research. First, our analyses not only demonstrated that classroom comparisons are at the heart of the BFLPE but also that class size affected the effect of classmates' achievement on perceived academic position. The latter result suggests that the accuracy of classroom comparisons is probably variable. Hence, it is important that future studies continue to focus explicitly on these comparisons and not take them for granted. Second, several studies have tried to identify variables that could influence individuals' susceptibility to the BFLPE but with mixed success (see Marsh et al. 2008). Yet, if the BFLPE is predominantly a consequence of gender in-group comparisons, as our results suggest, gender identification is likely to be an important individual moderator. It is reasonable to expect that the personal importance attached to one's gender identity affects the meaning and the impact of gender comparisons on achievements.

In addition to this, it would be interesting to examine whether reflected glory (or assimilation) effects exist for gender in-group comparisons. In contrast to the BFLPE, the notion of reflected glory states that students actually benefit from

being in better performing classrooms because this provides them with feelings of academic pride. Although there is clear evidence that the BFLPE overrides any effects of reflected glory (for a review, see Marsh et al. 2008), gender assimilation effects still need to be investigated. Furthermore, future studies should examine whether our result for gender in-group comparisons is limited to early adolescents or can be generalized to older samples. Gender distinctions might become more important in middle and late adolescence, making the effect of these comparisons on academic self-concept stronger. However, the growing interest and concern with cross-gender relationships in adolescence could also make out-group gender comparisons more important (Maccoby 1988).

There are some limitations to this study. Individual achievement, for example, was measured with the students' official secondary educational advice. Research has found that this advice is highly correlated ($r = .86$) with scores on the national standard school achievement test (Driessen and Doesborgh 2005). However, the educational advice does not always correspond fully to the score on this test. Differences between educational advice and the test score can be due to the fact that teachers take noncognitive factors into consideration, such as the pupil's motivation and the wishes of the parents and the child (Driessen and Doesborgh 2005). However, 70 percent of the variation in the educational advice can be attributed to students' language, math, and reading achievements. Hence, the secondary educational advice appears to be a valid measure of academic achievement.

The BFLPE tested in this study makes assumptions about causality whereas our data are cross-sectional. Previous research has shown that achievement influences academic self-concept but also that academic self-concept affects subsequent achievement (see Marsh and Craven 2006; Rosenberg et al. 1995). The present analysis, then, relates to one important direction of the mutual influence between academic achievement and academic self-concept. Yet it should be noted that bidirectionality is highly implausible for the central relation in our study: the link between classmates' *average* achievement and students' *individual* self-concepts.

Finally, all students attended schools in the Netherlands, and our findings with respect to perceived academic position, class size, and gender

need to be replicated in other countries. Still, there are good reasons to expect similar results in other (Western) samples. First, cross-national findings indicate that the size of the BFLPE is similar in the Netherlands as compared to other countries (Marsh and Hau 2003; Seaton et al. 2008), and it is likely that the mediating mechanism of perceived position operates in the same way. Next, additional analyses (not reported in the text) revealed similar effects for minority (Turkish and Moroccan) versus majority (Dutch) students.[4] In addition, children's orientation toward gender in-groups seems to be fairly universal (Maccoby 1988), and it is probably always more difficult to obtain accurate perceptions of classmates' achievements in larger classrooms.

In summary, the findings of this study support the critical role of social comparison in the big-fish–little-pond effect, as well as the role of class size and gender. These results are important for understanding the formation of academic self-concepts in educational contexts and, for example, for debates about the utility of academic selective schooling and ability grouping. Students in academically selective environments have lower academic self-concepts. Our findings show that this is due to social comparison processes, particularly with same-gender classmates.

NOTES

1. Within this scaling the lowest two levels and the highest two levels are relatively close to each other, and many children are given advice combining Levels 2 and 3 or Levels 3 and 4. For these reasons it was decided to include these combinations as separate scale points.
2. Although the data had a three-level structure with students nested in classes nested in schools, it was inappropriate to run three-level regression models. The reason is that class and school levels were heavily confounded as 53 schools (81.5 percent) were represented by only one class each. Most Dutch primary schools have only one class for each grade.
3. The effect of this operation was negligible because the rounded correlations between the original and transformed measures were 1.00.
4. The referent effects on academic self-concept and the effects of class size were similar for the three ethnic groups. For the Dutch, the effects of classmate achievement and gender out-group achievement were somewhat smaller (respectively, $p < .05$ and $p < .01$) but still negative (respectively, $p < .01$ and $p = .10$). We also explored whether students

tended to compare their academic achievements along ethnic in-group lines. There was a significant negative effect of ethnic in-group achievement on academic self-concept ($p < .05$) but not on perceived relative academic position.

REFERENCES

Aiken, Leona S. and Steven G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Thousand Oaks, CA: Sage.

Arbuckle, James L. 2007. *Amos 7.0 User's Guide*. Spring House, PA: Amos Development Corporation.

Baron, Reuben M. and David A. Kenny. 1986. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 51:1173-182.

Bernaards, Coen A. and Klaas Sijtsma. 1999. "Factor Analysis of Multidimensional Polytomous Item Response Data Suffering from Ignorable Item Nonresponse." *Multivariate Behavioral Research* 34:277-313.

Borland, Melvin V., Roy M. Howsen, and Michelle W. Trawick. 2005. "An Investigation of the Effect of Class Size on Student Academic Achievement." *Education Economics* 13:73-83.

Burns, Robert. 1979. *The Self-concept: Theory, Measurement, Development and Behaviour*. London: Longman.

Catsambis, Sophia, Lynn M. Mulkey, and Robert L. Crain. 1999. "To Track or not to Track? The Social Effects of Gender and Middle School Tracking." *Research in Sociology of Education and Socialization* 12:135-63.

Catsambis, Sophia, Lynn M. Mulkey, and Robert L. Crain. 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.

Cheung, Gordon W. and Roger B. Rensvold. 1998. "Cross-cultural Comparisons Using Non-invariant Measurement Items." *Applied Behavioral Science Review* 6:83-110.

Corell, Shelley J. 2001. "Gender and the Career Choice Process: The Role of Biased Self-assessments." *American Journal of Sociology* 6:1691-730.

Dai, David Y. and Anne N. Rinn. 2008. "The Big-Fish-Little-Pond Effect: What Do We Know and Where Do We Go from Here?" *Educational Psychology Review* 20:283-317.

Driessen, Geert and Jan Doesborgh. 2005. "Relaties tussen achtergrondkenmerken en competenties van leerlingen en hun advies voor voortgezet onderwijs" (Relations between Students' Background Characteristics and Their Secondary Educational Advice). Pp. 39-70 in *Van basis- naar voortgezet onderwijs.*

Voorbereiding, advisering en effecten, edited by G. Driessen, J. Doesborgh, G. Ledoux, M. Overmaat, J. Roeleveld, and I. van der Veen. Nijmegen/Amsterdam, the Netherlands: ITS/SCO-Kohnstamm Instituut.

Espenshade, Thomas J., Lauren E. Hale, and Chang Y. Chung. 2005. "The Frog Pond Revisited: High School Academic Context, Class Rank, and Elite College Admission." *Sociology of Education* 78:269-93.

Festinger, Leon. 1954. "A Theory of Social Comparison Processes." *Human Relations* 7:117-40.

Goethals, George R. and John M. Darley. 1977. "Social Comparison Theory. An Attributional Approach." Pp. 259-78 in *Social Comparison Processes: Theoretical and Empirical Perspectives*, edited by J. M. Suls and R. L. Miller. Washington, DC: Hemisphere Publishing Corporation.

Harter, Susan 1985. *Manual for the Self-perception Profile for Children*. Denver, CO: University of Denver.

Harter, Susan 1999. *The Construction of the Self: A Developmental Perspective*. New York: Guilford.

Hu, Li-Tze and Peter M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives." *Structural Equation Modeling* 6:1-55.

Jacobs, Janis E., Stephanie Lanza, D. Wayne Osgood, Jacquelynne S. Eccles, and Allan Wigfield. 2002. "Changes in Children's Self-competence and Values: Gender and Domain Differences across Grades One through Twelve." *Child Development* 73:509-27.

Kling, Kristen C., Janet S. Hyde, Carolin J. Showers, and Brenda N. Buswell. 1999. "Gender Differences in Self-esteem: A Meta-analysis." *Psychological Bulletin* 125:470-500.

Maccoby, Eleanor E. 1988. "Gender as a Social Category." *Developmental Psychology* 24:755-65.

Marsh, Herbert W. 1987. "The Big-Fish-Little-Pond Effect on Academic Self-concept." *Journal of Educational Psychology* 79:280-95.

Marsh, Herbert W. and Rhonda G. Craven. 2006. "Reciprocal Effects of Self-concept and Performance from a Multidimensional Perspective. Beyond Seductive Pleasure and Unidimensional Perspectives." *Perspectives on Psychological Science* 1:133-63.

Marsh, Herbert W. and Kit-Tai Hau. 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* 58:364-76.

Marsh, Herbert W., Chit-Kwong Kong, and Kit-Tai Hau. 2000. "Longitudinal Multilevel Models of the Big-Fish-Little-Pond Effect on Academic Self-concept: Counterbalancing Contrast and Reflected-glory

Effects in Hong Kong Schools." *Journal of Personality and Social Psychology* 78:337-49.

Marsh, Herbert W., Marjorie Seaton, Ulrich Trautwein, Olivier Lüdtke, K. T. Hau, Alison J. O'Mara, and Rhonda, G. Craven. 2008. "The Big-Fish-Little-Pond-Effect Stands up to Critical Scrutiny: Implications for Theory, Methodology, and Future Research." *Educational Psychology Review* 20: 319-50.

McPherson, Miller, Lynn Smith-Lovin, and James M. Cook. 2001. "Birds of a Feather: Homophily in Social Networks." *Annual Review of Sociology* 27:415-44.

Nowell, Amy and Larry V. Hedges. 1998. "Trends in Gender Differences in Academic Achievement from 1960 to 1994: An Analysis of Differences in Mean, Variance, and Extreme Scores." *Sex Roles* 39:21-43.

Preckel, Franzis, Moshe Zeidner, Thomas Goetz, and Esther J. Schleyer. 2008. "Female 'Big Fish' Swimming against the Tide: The 'Big-Fish-Little-Pond Effect' and Gender-ratio in Special Gifted Classes." *Contemporary Educational Psychology* 33:78-96.

Rasbash, Jon, William Browne, Michael Healy, Bruce Cameron, and Cristopher Charlton. 2004. *MLwiN, Version 2.0*. New York: Multilevel Models Project Institute of Education.

Riegle-Crumb, Catherine, George Farkas, and Chandra Muller. 2006. "The Role of Gender and Friendship in Advanced Course Taking." *Sociology of Education* 79:206-28.

Rosenberg, Morris. 1979. *Conceiving the Self*. San Diego, CA: Academic Press.

Rosenberg, Morris, Carmi Schooler, Carrie Schoenbach, and Florence Rosenberg. 1995. "Global Self-esteem and Specific Self-esteem: Different Concepts, Different Outcomes." *American Sociological Review* 60:141-56.

Ross, Catherine E. and Beckett A. Broh. 2000. "The Roles of Self-esteem and the Sense of Personal Control in the Academic Achievement Process." *Sociology of Education* 73:270-84.

Seaton, Marjorie, Herbert W. Marsh, Florence Dumas, Pascal Huguet, Jean-Marc Monteil, Isabelle Régner, Hart Blanton, Abraham P. Buunk, Frederick X. Gibbons, Hans Kuyer, Jerry Suls, and Ladd Wheeler. 2008. "In Search of the Big Fish: Investigating the Coexistence of the Big-Fish-Little-Pond Effect with the Positive Effects of Upward Comparisons." *British Journal of Social Psychology* 47:73-103.

Skaalvik, Einar M. and Sidsel Skaalvik. 2002. "Internal and External Frames of Reference for Academic Self-concept." *Educational Psychologist* 37:233-44.

Snijders, Tom A. B. and Roel J. Bosker. 1999. *Multilevel Analysis. An Introduction to Basic and Advanced Multilevel Modeling*. London: Sage.

Tabachnick, Barbara G. and Linda S. Fidell. 2001. *Using Multivariate Statistics*. Boston: Allyn and Bacon.

Townsend, Tony, ed. 2007. *International Handbook of School Effectiveness and Improvement*. New York: Springer.

Tymms, Peter. 2001. "A Test of the Big Fish Little Pond Hypothesis: An Investigation into the Feelings of Seven-year-old Pupils in School." *School Effectiveness and School Improvement* 12:161-81.

Van Rossum, Jacques H. A. and Adri Vermeer. 1994. "Harter's vragenlijst naar waargenomen competentie" (Harter's questionnaire for perceived competence). *Pedagogisch Tijdschrift* 19:9-30.

Verkuyten, Maykel, Jochem Thijs, and Kadir Canatan. 2001. "Achievement Motivation and Academic Performance among Turkish Early and Young Adolescents in the Netherlands." *Genetic, Social, and General Psychology Monographs* 127: 378-408.

Zeidner, Moshe and Esther J. Schleyer. 1998. "Big-Fish-Little-Pond Effect for Academic Self-concept, Test Anxiety and School Grades in Gifted Children." *Contemporary Educational Psychology* 24:305-29.

BIOS

Jochem Thijs, PhD, is an Assistant Professor at the Department of Interdisciplinary Social Science, and Researcher at the European Research Centre on Migration and Ethnic Relations (ERCOMER) at Utrecht University. His research interests include (ethnic) relations and interactions in educational contexts.

Maykel Verkuyten, PhD, is a Professor at the Department of Interdisciplinary Social Science, and Researcher at the European Research Centre on Migration and Ethnic Relations (ERCOMER) at Utrecht University. His research interests are in racism, discrimination and ethnic relations. His current research includes questions on ethnic identity, in particular among young people.

Petra Helmond, MSc, is a PhD student at the department of Developmental Psychology at Utrecht University. In her project she investigates the implementation quality and effectiveness of the intervention method EQUIP for juvenile delinquents in correctional centers.