



# The aspects and ability groups in which little fish perform worse than big fish: Examining the big-fish-little-pond effect in the context of school tracking



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## ABSTRACT

The present study focused on junior high-school graduates who were equally able but attended different-rank high schools, comparing their academic self-concept, school adjustment, and academic achievement upon the completion of senior high school. An overall-school analysis was used to replicate previous findings, and an adjacent-school comparison was conducted to compare the performance of students at the bottom of a higher track and their similar-ability counterparts at the top of a lower track. The results indicated that the big-fish-little-pond effect (BFLPE) affects the academic self-concept and school adjustment of certain students, but not their academic achievement. Furthermore, the BFLPE was present between the bottom students of the first-ranked school and the top students of the second-ranked school, but not between the bottom students of the second-ranked school and the top students of the third-ranked school. The obtained results indicate that the BFLPE may not necessarily be associated with cognitive outcomes such as academic achievement and tracking contexts with less contrasting groups.

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## 1. Introduction

According to social comparison theory (Festinger, 1954; Huguet et al., 2009; Zell & Alicke, 2009), students compare their academic achievements with those of their peers. Therefore, the different environments of social comparison in highly selective and regular schools may influence students in two domains: (a) the affective domain, including motivation in learning, self-esteem, self-efficacy, and self-concept; and (b) the cognitive domain, such as their subsequent academic achievement.

Research on the affective aspect has indicated that academic self-concept is lower in students in highly selective schools than in those with similar abilities attending regular schools (Dai & Rinn, 2008; Marsh & Hau, 2003; Marsh & Parker, 1984; Parker, Marsh, Lüdtke, & Trautwein, 2013; Zeidner & Schleyer, 1998). This outcome is often attributed to the big-fish-little-pond effect (BFLPE). Further research demonstrated that the BFLPE also appears in other affective outcomes such as learning motivation, interest (Trautwein, Lüdtke, Marsh, Köller, & Baumert, 2006) and career aspirations (Nagengast & Marsh, 2012).

Currently, there are several limitations to the BFLPE that need to be addressed. The first issue is how to expand the BFLPE to broader areas of students' behaviors and psychological states. Based on the relationships among school composition, academic self-concepts, and career aspirations, researchers proposed that the BFLPE has important implications for school composition policies and practices (e.g., Marsh, 1991; Parker et al., 2013; Skaalvik & Skaalvik, 2002). However, school adjustment, an important affective characteristic which was found to be strongly correlated with academic self-concept (Haynes, 1990; Roeser & Eccles, 1998) and to influence students' mental health in different school tracks (Salmela-Aro, Kiuru, & Nurmi, 2008; Wouters, de Fraigne, Colpin, van Damme, & Verschueren, 2012), has been ignored in previous studies of the BFLPE. Therefore, the first purpose of this study is to investigate whether the BFLPE is able to extend to students' school adjustment. Secondly, in terms of the cognitive domain, there has been little research on whether the BFLPE also affects academic achievement, whereby students in highly selective schools perform worse than their equally able counterparts in regular schools. A few studies found that the BFLPE extends to academic achievement, meaning that students in a higher-ranked school perform worse than their equally able counterparts in a lower-ranked school (e.g., Marsh, 1991; Zeidner & Schleyer, 1998). Unfortunately, these studies did not use reliable

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measurement tools to index academic achievement, and thus were unable to identify how the BFLPE impacted academic achievement. The second purpose of this study is to investigate whether the BFLPE extends to students' academic achievement by employing a standardized entrance examination as a common metric for all participants.

Third, although studies using school tracking or ability grouping as a context for exploring the BFLPE are increasing, the results are not conclusive. According to the theory of the BFLPE, students in higher-ranked schools should develop lower academic self-concepts than their equally able counterparts in lower-ranked schools after controlling for students' initial abilities, and vice versa (Liu, Wang, & Parkin, 2005; Trautwein et al., 2006; Wouters et al., 2012). However, some research showed that students in higher track schools presented positive academic self-concepts while students in lower track schools presented lower academic self-concepts (van Houtte & Stevens, 2009), still other research showed that there was no BFLPE between different school tracks (Cheung & Rudowicz, 2003; Ireson & Hallam, 2009). As the results from previous research seem to go against the general theory, the third purpose of this study is to clarify the effects of school tracking on the BFLPE.

To realize the purposes above, the present study employed several methods different from previous research. First, it investigated the BFLPE from both the affective (i.e., academic self-concept and school adjustment) and cognitive (i.e., academic achievement) components of student performance. Since there is no previous research on how the BFLPE influences school adjustment, the present study was able to expand the theoretical basis for the BFLPE and school adjustment by including school adjustment as an outcome variable.

Second, previous studies (Marsh, 1987, 1991; Marsh & O'Mara, 2010; Trautwein et al., 2006; Zeidner & Schleyer, 1998) used grade point average (GPA) to determine that academic achievement shows the BFLPE. The conclusions drawn from GPA are not solid because students in different schools or groups were scored using different GPA systems. A common metric, such as a commonly applied standardized achievement test, for comparing students in different schools or tracks is critical for clarifying the relationship between the BFLPE and academic achievement. The present study used the scores of the General Scholastic Ability Test (GSAT, see Section 3), an official college entrance examination system for all senior high school students in Taiwan, as an objective index to determine students' beginning and ending levels of academic achievement after they completed their learning in their tracked schools.

Third, two methods of data analyses were employed: overall-school analysis and adjacent-school comparison. The concept of overall-school analysis was based on Marsh (1987) (1991) and Marsh and O'Mara (2010) investigating the correlation between school-average ability and student performance after controlling for academic ability. In the present study, hierarchical linear modeling (HLM, Raudenbush, Bryk, & Congdon, 2004) was conducted to replicate this analysis. If there is a BFLPE, school-average ability should be negatively correlated with the academic self-concept, school adjustment, and academic achievement when students' initial abilities, measured by the Basic Competence Test for Junior High School Students (BCTEST, see Section 3) are controlled.

In addition, the present study conducted adjacent-school comparisons to investigate the difference between equally able students who entered the bottom of higher-ranked schools (little fish in a big pond) and the top of lower-ranked schools (big fish in a little pond). According to the BFLPE hypothesis, students at the bottom of highly selective schools might experience more failures that lower their academic self-concept, school adjustment, and academic achievement.

Therefore, we hypothesized that students at the bottom of a higher-ranked school would have lower academic self-concepts, school adjustment, and academic achievements than their counterparts at the top of the adjacent lower-ranked school. This novel analysis method responds to the suggestion of Dai and Rinn (2008) that the BFLPE context should be narrowed down from the school level to the student level. Such an analysis can also be used to compare the BFLPE between adjacently-ranked schools and find out to what level of schools (first-ranked school vs. second-ranked school and second-ranked school vs. third-ranked school) the BFLPE extends.

The adjacent-school comparison method has two advantages. First, using only students with equal abilities in each adjacent school or track for making between-subject comparisons will provide clearer evidence of differences than using the aggregated students' outcomes from within the same school or rank (e.g., Liu et al., 2005). Even if in the same school or rank, students may still exhibit different levels (e.g., lower, medium, and higher) of perception of social comparisons and achievements. Second, by observing if the BFLPE affects students in different ranks of schools, the effects of tracking on the BFLPE will be examined more precisely.

## 2. Literature review

### 2.1. The BFLPE and academic self-concept

Marsh and his colleagues have performed the most prominent research on how the BFLPE influences affective outcomes manifested by equally able students in different school tracks (e.g., Marsh, 1987, 1991; Marsh & Hau, 2003; Marsh, Trautwein, Lüdtke, Baumert, & Köller, 2007). The BFLPE refers to how the academic self-concept of equally able students is influenced by placement in different ability groups. Due to social comparison, self-concept is lower in students in a high-ability group than in their counterparts in a low-ability group (Marsh, 1987; Marsh & Hau, 2003). The existence of a BFLPE has been supported by abundant empirical studies. For example, many studies have found a negative correlation between school grades and academic self-concept, when controlling for the ability of individual students (Marsh, 1991; Marsh and Hau, 2003).

The BFLPE has also been observed occurring in cross-cultural contexts. Marsh and Hau (2003) analyzed the data collected by the Programme for International Student Assessment (PISA) in the year 2000 to investigate the BFLPE in 26 countries. The research findings indicated that school-average ability was negatively correlated with academic self-concept in most of the participating countries, with the strength of this correlation varying among the included countries, thus providing cross-cultural evidence for the BFLPE. Seaton, Marsh, and Craven (2009) expanded the scale of the research to analyze the PISA 2003 data gathered from 41 countries in 2003 and found a significant negative correlation (with an average coefficient of  $-.41$ ) between school-average ability and academic self-concept in the aggregated sample of all 41 countries.

Even though that the BFLPE affects academic self-concept is supported by a large amount of research, it has been criticized by some researchers. The first criticism is that the theoretical basis of the BFLPE needs to take into account the complexity and multifaceted nature of social comparison and self-appraisal processes (Dai, 2004). Moreover, the process that mediates the formation of self-concept has been inferred rather than examined, and therefore the causality of the BFLPE remains unclear (Dai & Rinn, 2008).

The second criticism is that the context in which the BFLPE was observed has not been specified adequately. Most studies on the BFLPE investigated differences in academic self-concept among

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