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On: 09 January 2015, At: 02:35

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



The Journal of Experimental Education

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/vjxe20>

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Published online: 24 Mar 2014.



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To cite this article: Gregory Arief D. Liem, Dennis M. McInerney & Alexander S. Yeung (2015) Academic Self-Concepts in Ability Streams: Considering Domain Specificity and Same-Stream Peers, The Journal of Experimental Education, 83:1, 83-109, DOI: [10.1080/00220973.2013.876227](https://doi.org/10.1080/00220973.2013.876227)

To link to this article: <http://dx.doi.org/10.1080/00220973.2013.876227>

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MOTIVATION AND SOCIAL PROCESSES

Academic Self-Concepts in Ability Streams: Considering Domain Specificity and Same-Stream Peers

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The study examined the relations between academic achievement and self-concepts in a sample of 1,067 seventh-grade students from 3 core ability streams in Singapore secondary education. Although between-stream differences in achievement were large, between-stream differences in academic self-concepts were negligible. Within each stream, levels of students' achievement and their self-concepts were systematically related only when considered in the matching academic domain and the appropriate level of specificity. In English, lower achievers in the high-ability stream tended to underestimate their achievement, whereas higher achievers in the low-ability stream tended to overestimate their achievement. This pattern, however, was not evident in mathematics and the general academic domain. Taken together, the findings highlight the importance of considering the interplay of domain specificity and same-stream peers in academic self-concepts.

Keywords *ability grouping, domain specificity, self-concept, social comparison, streaming*

POSITIVE ACADEMIC SELF-CONCEPT, or one's favorable evaluation of academic abilities, has been seen as a valuable quality in its own right and also a critical factor that facilitates development of other desirable outcomes (for reviews, see Branden, 1994; Marsh, 2007). A meta-analysis by Valentine, DuBois, and Cooper (2004) has demonstrated that academic self-concept and achievement—teacher-assigned grades and standardized test scores—have reciprocal

longitudinal effects, with prior academic achievement and self-concept leading to enhancements and improvements in subsequent academic self-concept and achievement. It is important to note that Valentine and colleagues (2004) also found no systematic difference between the importance of self-concept and self-efficacy measures in predicting growth in academic performance. Other studies (e.g., Guay, Larose, & Boivin, 2004) have indicated that academic self-concept in high school was more salient than actual academic performance in predicting academic effort expenditure, educational and occupational aspirations, and subsequent university course selection and attendance. Guay and colleagues (2004), for example, found that students' positive academic self-concepts were associated with better educational outcomes 10 years later—the finding that these researchers regarded as “good support for the long-lasting effects of academic self-concept” (p. 64). It is based on these reasons that self-concept researchers (e.g., Marsh, 2007; Valentine et al., 2004) have made a reasonable claim that promoting positive academic self-concepts is an important approach to optimizing achievement and other educational attainments, and that students' future educational outcomes are likely to be undermined if their academic self-concepts are inadvertently undermined.

THE BIG-FISH-LITTLE-POND EFFECT MODEL

Self-concept researchers (e.g., Skaalvik & Skaalvik, 2002) have maintained that academic self-concepts are constructed based on various frames of reference, one of which involves social comparison processes whereby students compare their own achievement with the average achievement of other students in the learning context (e.g., school or class), and use this relativistic, interindividual evaluation as a basis to form their academic self-concepts. Following this social comparison, the Big-Fish-Little-Pond Effect (BFLPE; Marsh, 1987) model predicts the following:

... students have lower self-perceived academic skills and lower academic self-concepts when they compare themselves with more able students, and higher self-perceived academic skills and academic self-concepts when they compare themselves with less able students (p. 287).

As the visual representation in Figure 1 shows, the BFLPE model posits that while individual students' academic achievement has a positive predictive relation to their academic self-concept (i.e., the higher my academic achievement, the more capable I see myself; the lower my academic achievement, the less capable I see myself), the average achievement of students in a given learning context (context-average achievement) has a negative predictive relation to the individual students' academic self-concept (i.e., the smarter my peers in general, the less capable I see myself; the lower the achievement of my peers in general, the more capable I see myself). In other words, students' academic self-concepts are associated with, and can be predicted by, the juxtaposition of their own academic achievement and the average achievement of their peers in the learning context. In support of the BFLPE model, research has shown that in a selective program where gifted students are grouped together, the ability grouping appeared to lower academic self-concepts (Marsh, Chessor, Craven, & Roche, 1995; Preckel & Brüll, 2008, 2010; Preckel, Göetz, & Frenzel, 2010). At the other end of the spectrum, intellectually challenged students had higher academic self-concepts in a special need class than when they were placed in a mixed-ability (ungrouped) class (Chapman, 1988; Crabtree, 2003; Marsh, Tracey, & Craven, 2006).

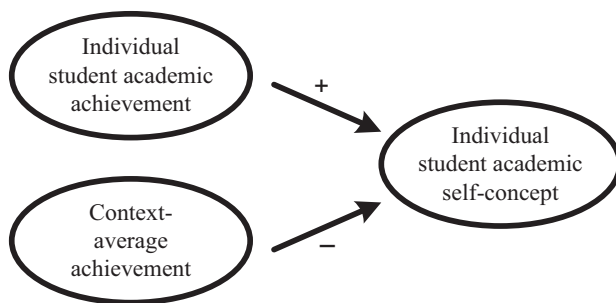


FIGURE 1 Visual Representation of the Big-Fish-Little-Pond Effect (BFLPE) Model (adapted from Liem et al., 2013). The plus signs refers to a positive predictive association between individual student academic achievement and academic self-concept, and the negative sign refers to a negative predictive association between context-average achievement and student academic self-concept.

Building upon prior BFLPE studies in ability-grouped settings, the present study aimed to examine the patterns of students' academic self-concepts in different ability streams and how these may relate to their prior academic achievement. In doing so, it extends the literature by investigating these relations in specific and general academic domains as well as among students across (between) and within ability groups. The study was specifically informed by two contemporary theoretical perspectives particularly relevant to understanding the construction of self-evaluations of prior attainments and, by implication, to the BFLPE research program. The first refers to the *local dominance effect* (Zell & Alicke, 2009, 2010) which posits the salience of proximal (or local) frames of reference, relative to the more distal ones, in self-evaluations of one's performance. The second, the *specificity matching* principle (Swann, Chang-Schneider, & McClarty, 2007), emphasizes the importance of considering the same level of specificity (or generality) in understanding the relations between self-perceptions about one's performance and the actual performance that one attains. It is the interplay between these theoretical perspectives that underpins the conceptualization of the present study and its proposed hypotheses. The two key theoretical perspectives, their importance for the understanding of the construction of academic self-concept in the BFLPE research, and their relevance to the present study are subsequently elaborated.

Local Dominance Effect

Of particular importance to the self-concept and BFLPE research is a theoretical perspective called the local dominance effect (Alicke, Zell, & Bloom, 2010; Zell & Alicke, 2009, 2010). This perspective posits that individuals tend to base self-evaluations of their prior attainments on the most local frame of reference available to them, and when more than one piece of comparison information are available, the most local one dominates the more general ones. Thus, even when individuals have access to more general frames of reference, which provide a more representative yardstick in informing their standing relative to a wider group of people, they prefer to use the most local one even if it is less representative.

With a sample of 4,461 seventh- to ninth-grade students in Singapore, Liem, Marsh, Martin, McInerney, and Yeung (2013) recently examined the applicability of the local dominance effect by juxtaposing the negative effects on academic self-concept of the average achievement of students in the same class, the same stream, and the same school (i.e., the examination of BFLPEs as a function of three contextual frames of references that vary in their levels of locality). These researchers focused their investigation on the BFLPEs in two specific academic domains, English and mathematics, and used multilevel regression techniques to find evidence for the negative predictive relations between context-average achievement and academic self-concept (i.e., the BFLPEs). In support of the local dominance effect, the effect of stream-average achievement on students' academic self-concepts was more negative than, and completely subsumed, the negative effect of school-average achievement. It is surprising that stream-average achievement was equally predictive of English self-concept as class-average achievement which was the most local frame of reference examined in the study and, therefore, should be the most influential contextual predictor. Furthermore, stream-average achievement was even a more salient frame of reference than class-average achievement in the formation of students' math self-concept.

Consistent with the BFLPE model, the significant negative regression weight of the stream-average achievement on academic self-concepts found in Liem and colleagues' (2013) study suggests that, when the students' actual academic performance is controlled, students in the low ability stream (i.e., the stream with relatively lower average achievement) would have more positive academic self-concepts, and students in the high ability stream (i.e., the stream with relatively higher average achievement) would have more negative academic self-concepts. Building upon Liem and colleagues' (2013) study that primarily sought to examine the BFLPE in Figure 1 by assessing *predictive relationships* between context-average achievement, prior achievement, and academic self-concepts in English and math of students across different ability streams, the present investigation focused on the *levels* (or *means*) of academic self-concepts of students between and within ability streams. Furthermore, to test predictions related to the specificity matching principle, the present study assessed self-concepts in specific and general academic domains (English, mathematics, and school self-concepts). In relation to the within-stream investigation, we aimed to ascertain the extent to which particular groups of students (i.e., higher and lower achievers) within high and low ability streams may commit to a contextual neglect bias (elaborated later).

In a recent extension of the local dominance effect research, Alicke and colleagues (2010; see also Zell & Alicke, 2009, 2010) conducted a series of experiments each of which contained 10 participants who were divided into one of two 5-person groups. Participants were asked to complete a test and were subsequently given experimentally manipulated feedback. Regardless of their actual performance on the test, half of the participants were told that they ranked fifth and the other half ranked sixth out of the 10 test-takers. Some of the participants who ranked fifth were also told they were the worst in their 5-person group, and some of the participants who ranked sixth were also told that they were the best in their 5-person group. Consistent with the local dominance effect, participants who ranked sixth out of 10 people but best in their 5-person group had the most positive self-evaluations of their ability, whereas participants who ranked fifth of 10 people but worst in their 5-person group had the least favorable evaluations of their ability. These findings have provided strong evidence for the superiority of a local frame of reference that even leads individuals to use *less representative* and *narrow* comparison information for

their self-evaluations. This local information constituted such a salient frame of reference that individuals overlooked a more representative and general context against which they could more accurately form their self-evaluations—a phenomenon attributed to a *contextual neglect* bias (Zell & Alicke, 2009).

We contend that the contextual neglect bias may also occur in a naturalistic school setting where students are placed in different ability groups. As reviewed earlier, previous studies have shown that a streamed setting is a salient frame of reference in students' evaluations of their academic performance such that students in the high-ability stream had lower academic self-concepts than less able students in lower-ability streams. However, self-evaluation processes of high and low achievers in each stream and the role of other students in each stream (same-stream peers) as a frame of reference in these self-evaluations have not been systematically studied. In view of the potential contextual neglect bias effect, the use of same-stream peers as a frame of reference may lead to distorted self-evaluations of academic abilities of students in an ability stream setting. Lower achievers in the high-ability stream may have disproportionately lowered academic self-concepts because they base their self-evaluations on same-stream peers who are generally academically strong. In contrast, higher achievers in the low-ability stream may develop disproportionately heightened academic self-concepts because they use same-stream peers who are generally academically weak as a frame of reference. Extending Liem and colleagues' (2013) study reviewed earlier, the present investigation aimed to ascertain the extent to which this is the case.

Domain Specificity in Achievement–Self-Concept Relations

Another theoretical perspective critical to the BFLPE research is the multidimensional and hierarchical perspective of academic self-concept (Marsh, Byrne, & Shavelson, 1988; Shavelson, Hubner, & Stanton, 1976). This model posits that general academic self-concept, located at the apex of the hierarchy, is a higher-order factor that encompasses lower-order factors representing self-concepts in specific subject areas (e.g., mathematics, English) at the bottom of the hierarchy. In support of this model, research studies have demonstrated the multidimensional and hierarchical nature of academic self-concept in a diverse range of educational fields (e.g., Vispoel, 1995; Yeung, Chui, & Lau, 1999; Yeung, Chui, Lau, McInerney, & Russell-Bowie, 2000) and national contexts (Brunner et al., 2010). Yeung and colleagues (2000), for example, demonstrated the capacity of a general academic self-concept measure to capture the variance of academic self-concepts in accounting, mathematics, economics, English, and Chinese (each of which was a well-defined factor in itself).

The literature has also suggested that the relations between academic self-concept and achievement are remarkably domain specific (for meta-analyses, see Möller, Pohlmann, Köller, & Marsh, 2009; Valentine et al., 2004). In an early study, Marsh (1992) examined domain specificity of eight core school subjects (e.g., mathematics, English, science, history) and six noncore school subjects (e.g., music, health, religion) and found clear patterns showing that the associations between academic achievement and self-concept in the corresponding subjects were more highly correlated (r s between 0.45 and 0.70, mean $r = 0.57$) than those in the noncorresponding subjects (r s between 0.17 and 0.54, mean $r = 0.33$). In another study, Marsh and colleagues (2006) found large and systematic patterns of relations between math, German, and English self-concepts and

achievement in the matching subject areas. Math self-concept, for example, was substantially and positively related to math grades ($r = 0.71$) but its correlations with English grades ($r = 0.11$) and German grades ($r = 0.06$) were relatively low.

While investigations of domain-specific psychoeducational constructs provide valuable information about academic functioning in specific school subjects, there is a call to examine both domain-specific and domain-general constructs to fully understand student academic trajectory (Brunner et al., 2010; Lubinski, 2004). This call aligns with the *specificity matching* principle advocated by Swann and colleagues (2007) in understanding the importance of self-views in human functioning, which specifically maintains that domain-specific self-views (e.g., math self-concept) should be used to predict domain-specific outcomes (e.g., math performance) and domain-general self-views (e.g., general academic self-concept) should be used to predict domain-general outcomes (e.g., GPA). Furthermore, this perspective also maintains that the relations between individuals' global/general evaluations of overall performance across distinct domains and aggregates of their actual performances across these domains are likely to be weaker and more ambiguous than when they are considered in more specific areas as different performance domains may have different levels of perceived saliency and importance to different individuals (Hardy & Moriaty, 2006; Swann et al., 2007).

With the exception of studies by Ireson and colleagues (Ireson & Hallam, 2009; Ireson, Hallam, & Plewis, 2001), juxtaposition of the effects of ability grouping on general and specific facets of academic self-concept is relatively scarce. In these U.K.-based studies, schools varied in the extent to which ability grouping was implemented: some schools tracked students for all academic subjects, some tracked students only on a few subjects, and some others did not track at all. In their earlier study, Ireson and colleagues (2001) found that general academic self-concept was higher among students in the schools with moderate levels of tracking. The degree of subject-specific tracking (measured by the number of years of tracking in a specific subject experienced by students) had a negative effect on students' English self-concepts, but not on math and science self-concepts.

In the more recent study, Ireson and Hallam (2009) found small effects of between-school differences in tracking such that students in schools implementing more ability grouping had relatively lower general academic self-concepts than those in schools with less ability grouping. Unlike their earlier study (Ireson et al., 2001), however, the duration of subject-specific ability grouping experienced by students had no effects on any of the specific facets of their academic self-concepts. Of particular relevance, Ireson and Hallam (2009) extended their analysis by classifying students into high-ability, average-ability, and low-ability groups in mathematics, English, and science comprising the top 25%, the middle 50%, and the lowest 25% of students in each school, respectively, using the students' achievement in each subject. This analytic approach resulted in clearer evidence for the relations between students' ability group membership and their level of academic self-concept in specific domains. For example, students identified as high achievers in math had higher math self-concepts than those identified as average or low achievers in the subject.

The studies by Ireson and colleagues have shed some light on the potentially differential effects of ability grouping, both across and within schools (for individual school subjects), and on general and specific facets of academic self-concepts. As these researchers noted, however, interpretations of their findings were limited by the fact that their sample was drawn from the education system in which ability grouping was not implemented uniformly across schools and

subjects. Consequently, their follow-up analysis which assigned the participants into different ability groups was based on different ranges of cut-off values which were idiosyncratic across schools. Moreover, given the lack of common tracking practice across schools, the studies used the length of students' experience of ability grouping—rather than track membership—in predicting academic self-concepts. The present study was conducted in an education system in which all the secondary schools follow the same national streaming policy that places students in one of the three core ability streams—with comparable ranges of cut-off values for each stream across schools—on the basis of their performance on the same set of standardized achievement tests. This context is then a more ideal setting to better understand the impact of ability grouping on academic self-concept.

Applied Implications of the Present Investigation

The general aim of the present study was to examine the patterns of academic self-concepts of students in a streamed setting. We see potential educational implications of our findings in informing teachers as they seek to optimize student educational outcomes through the enhancement of academic self-concept. The literature has established that academic self-concepts are malleable through interventions (Haney & Durlak, 1998; O'Mara, Marsh, Craven, & Debus, 2006; Scheirer & Kraut, 1979). In a recent meta-analysis of 200 self-concept enhancement interventions in 145 published studies, O'Mara and colleagues (2006) found that interventions directly seeking to enhance a specific self-concept domain (e.g., reading self-concept) and then measuring that targeted domain were the most effective, yielding an effect size of $d = 1.16$, which was higher than, for example, interventions aimed to promote a specific self-concept domain but measured a global self-concept ($d = 0.41$). The meta-analysis also indicated that interventions employed various techniques in enhancing self-concepts, with interventions using praise and/or feedback yielding the strongest effect size ($d = 1.13$) which was more effective than those focusing on only skills training ($d = 0.42$). In summary, interventions appear to be more effective when they directly seek to enhance specific domains of academic self-concept and use praise and feedback to develop academic self-concept and learning skills simultaneously.

The enhancement of academic self-concept has also been found to be associated with heightened academic performance (e.g., Häussler & Hoffmann, 2002; Marsh & Richards, 1988). Marsh and Richards (1988), for example, assessed the effect of a 6-week Outward Bound Bridging Course designed to produce gains in reading and math self-concepts and achievements for underachieving adolescents through the integration of remedial teaching and learning experiences. Consistent with the program's academic emphasis, at the end of the course the participants' reading and math self-concepts were substantially enhanced, their actual reading and math achievements were significantly improved, and that the gains in the two domain-specific academic self-concepts targeted by the course were markedly larger than the gains in nontargeted domains of self-concept (e.g., appearance, social), providing clear support for "a successful systematic intervention designed to enhance both academic achievement and academic self-concept" (p. 296).

Another example is a large-scale intervention designed to enhance seventh-grade girls' physics self-concepts and achievement by Häussler and Hoffmann (2002). These researchers conducted an intervention across a whole academic year with around 60 one-hour lessons and which comprised 12 treatment and seven control classes. In the treatment groups, an interest-guided

physics curriculum was implemented and the teachers were provided with a special workshop to train communication and interaction skills that aim to promote their students' physics self-concepts. The results showed that physics self-concepts, perceived instrumentality of physics, and physics achievement of the girls in the treatment classes were significantly higher at the end of school year and this achievement gain was maintained even 1 year after intervention. Taken together, the effectiveness of the interventions in enhancing academic self-concept and achievement reported in these studies signifies the importance of understanding the patterns of academic self-concepts of students in different ability streams, particularly in identifying groups of students for whom self-concept-enhancement intervention needs to be specifically devised and targeted to.

THE PRESENT STUDY: PURPOSE, CONTEXT, AND HYPOTHESES

Guided by the local dominance effect (Zell & Alicke, 2009, 2010) and the specificity matching principle (Swann et al., 2007) and motivated by the literature showing the malleability of academic self-concepts (O'Mara et al., 2006), the study aimed to clarify the patterns of relations between academic self-concepts and prior achievement of students between and within ability streams and the extent to which these patterns are domain specific. The present study was conducted in Singapore secondary education which provides a unique and ideal setting to examine these issues as all the secondary schools follow the same national streaming policy and place students in one of the three core ability streams (high ability, middle ability, and low ability). This streaming is based on students' performance on the Primary School Leaving Examination (PSLE)—a set of national achievement tests attempted by all students in the final year of their primary education. English, math, science, and mother tongue are the four academic subjects tested in the PSLE. Students' PSLE total score (an aggregate score across the four subjects) determines their placement in a particular stream. This suggests that the ability grouping in the Singapore secondary education is based on the same set of achievement tests, implemented with comparable ranges of cutoff values for each stream across schools, and considered a general academic ability streaming (rather than subject-specific streaming).

Two sets of hypotheses pertaining to between- and within-stream research issues were proposed and tested in this study. They are subsequently described.

Between-Stream Hypotheses

Consistent with the general BFLPE model (Marsh, 1987) and the finding of Liem and colleagues' (2013) study, placements in the high- and low-ability streams would have reversed effects and, as such, we hypothesized that stream differences in students' prior academic achievement would be large (Hypothesis 1), but stream differences in academic self-concepts would be small (Hypothesis 2).

Within-Stream Hypotheses

On the basis of the local dominance effect (Zell & Alicke, 2009, 2010) and the salience of stream context (as opposed to school or class settings) found by Liem and colleagues (2013),

we hypothesized that regardless of stream membership, higher achievers in each stream would have higher academic self-concepts than their lower achieving counterparts (Hypothesis 3). Furthermore, given the salience of ability stream may lead to a contextual neglect bias (Alicke et al., 2010), we also hypothesized that lower achievers in the high-ability stream would have disproportionately lowered academic self-concepts (Hypothesis 4), whereas higher achievers in the low-ability stream would have disproportionately heightened academic self-concepts (Hypothesis 5). Most important, aligned with the specificity matching principle (Swann et al., 2007), support for Hypotheses 3–5 was expected only when higher and lower achievers in each stream are categorized and compared based on their prior achievement in a matching domain and level of specificity. Within each ability stream, students' self-concepts in a given academic subject (or a general academic domain) is associated with, and can be predicted by, the juxtaposition of their own achievement and their same-stream peers' average achievement in the corresponding specific subject (or the matching level of generality). In this respect, we sought to address the purpose of the study by conducting level- or mean-oriented analyses.

METHOD

Sample

The sample involved in the present study comprised 1,067 Singaporean Secondary-1 (seventh grade) students drawn from 40 classes (19 high-ability classes, 12 middle-ability classes, and 9 low-ability classes) in seven schools, with the number of students drawn from each class ranging between 11 and 41 (median = 27). These participants were a subset of the overall sample (Secondary-1 to Secondary-3) whose responses were analyzed in a recent study by Liem and colleagues (2013). As the present study focused on the (mean) comparisons of academic achievement and self-concepts across and within-streams, it is important that the sample was drawn from a single cohort for whom achievement scores are comparable across students in the cohort and the ranges of these achievement scores used for stream placement are comparable across schools. Moreover, compared with their Secondary-1 and 2 counterparts, the Secondary-1 students in the overall sample came from a cohort for whom PSLE scores were most recently obtained (around 6–7 months before the data collection) and this provided an ideal condition to understanding the relation between academic achievement and self-concept in this study.

The sampling of schools was carried out in a way that ensured representation of each of Singapore's educational jurisdictions (north, south, west, and east). In total, 566 (53.05%) were boys and 492 (46.11%) were girls (9 [0.84%] missing values). The mean age of the participants was 12.95 years ($SD = 0.65$). Of the total sample, 569 (53.32%) students were in the high-ability stream, 324 (30.37%) students were in the middle-ability stream, and 174 (16.31%) students were in the low-ability stream. This sample mirrored the proportion of students across streams in the recent Secondary-1 student cohort (Singapore Ministry of Education, 2009). Given the school sampling procedure, the sample size, and the range of sample characteristics, the sample represented a good cross-section of Singaporean Secondary-1 students.

Measures

As English is the primary medium of instruction at schools, the official working language, and the main language used to communicate with people from different ethnic backgrounds, Singaporean students can be considered as proficient in English. Hence, we administered the survey to students in English.

Academic Self-Concept

To measure English, math, and general academic or school self-concepts (ESC, MSC, and SSC, respectively), we used items drawn from the Self-Description Questionnaire II (SDQ-II; Marsh, 2007). The English Self-concept Scale ($\alpha = .93$; 5 items; e.g., “I am good at English,” “I get good marks in English,” “I have always done well in English,” “Work in English is easy for me,” and “I learn things easily in English”) measures students’ self-evaluation of their academic competence in English. The Mathematics Self-Concept Scale ($\alpha = .97$), consisting of five parallel items with the English self-concept items except that “mathematics” was used instead of “English,” measures students’ self-evaluation of their academic competence in math. The School Self-concept Scale ($\alpha = .93$), also comprising the five parallel items with “English” replaced with “most subjects,” measures students’ self-evaluation of their academic competence across different school subjects. Participants were provided with a response scale ranging from 1 (*false*) to 6 (*true*).

Confirmatory factor analysis was performed to test the dimensionality of these academic self-concept scales used. The measurement model tested was built by three inter-related latent variables representing the three self-concept measures and each of the latent factors was predicted by its five constituent items’ scores as observed variables. The analysis indicated a good fit of the model to the data, $\chi^2 = (87, n = 1,067) = 935.93, p < .001$, confirmatory fit index = .95, and nonnormed fit index = .94 (see Marsh, Balla, & Hau, 1996). All factor loadings were significant at $p < .001$, ranging between .76 and .91 for ESC items, between .87 and .93 for MSC items, and between .79 and .88 for SSC items. Considered together, psychometric properties of the self-concept scales used in this study were sound and provided a robust measurement basis for statistical analyses aimed at addressing the substantive questions central to the study.

Academic Achievement

Students’ Primary School Leaving Examination (PSLE) scores were used as indicators of their academic achievement in this study. The PSLE scores were derived from students’ performances on a set of standardized tests which were administered nationwide to measure proficiencies in math, English, science, and mother tongue of all Primary-6 students in Singapore. A student’s PSLE score in each subject was adjusted (T-standardized) to scores of all other students taking the tests in the same year. Thus, PSLE scores are comparable for all students across schools in the same cohort. In their final report card, individual students received information on their PSLE total score (up to around 300)—a proportionately weighted and aggregated score—that reflects their overall performance across the four PSLE subjects. In addition, students also received a grade for each subject ranging between A* and u (ungraded or fail). For purposes of the present analyses, students’ PSLE grades in English and math were converted to numeric values (A* = 7,

A = 6, B = 5, C = 4, D = 3, E = 2, u = 1) with higher scores representing higher proficiency levels in these subjects. While students' aggregate PSLE score (PSLE total) was used as an indicator of their prior achievement in a general academic domain, their PSLE English and PSLE math grades were used to indicate their prior achievement in specific academic domains.

As in the Liem and colleagues (2013) study, the PSLE scores and grades in the present study were self-reported by the participants (i.e., they were asked, "What is your total PSLE score? What is your PSLE score for English and math?"). In addition, three schools provided us with their participating students' PSLE scores. The correlation between the students' self-reported and school-obtained PSLE scores was high ($r = .93, p < .001$), pointing to the relatively high reliability of students' self-reported achievement scores in this study. This is consistent with prior studies showing that students' self-reported grades are not markedly affected by systematic bias (e.g., Dickhäuser & Plenter, 2005), are good reflections of students' actual grades, and generally predict outcomes to a similar extent as students' actual grades (Kuncel, Credé, & Thomas, 2005). In line with prior findings (e.g., Kuncel et al., 2005), the set of student-reported PSLE-Total (PSLE-T) scores ($M = 166.62, SD = 39.90$) was slightly higher than the corresponding set of scores provided by the schools ($M = 165.23, SD = 40.71$). *T* test indicated that, although this difference was statistically significant, $t(665) = 2.38, p = .02$, it was negligible with a very small effect size, $\eta^2 < .01$.

Procedure

The survey was administered in intact groups by trained researchers upon human ethics research clearance and permission by the school principals. Participants were first briefed that the purpose of the survey was to understand their school motivation and learning. To encourage participants to give genuine answers, it was emphasized that their responses were confidential, would not affect their school grades, and would be analyzed collectively and not individually. Participants were also told that there were no right or wrong answers to any of the questions and that honest responding was of great importance in the study. It took around 45 minutes for the participants to complete the overall survey encompassing measures of academic self-concept used in this study and other constructs not part of the present study (e.g., learning, motivation). PSLE scores, as indicators of students' prior achievement, were obtained by students at the end of their primary school education, approximately 8 months prior to the survey.

Statistical Analyses

The overarching purpose of the study was to clarify the patterns of students' academic self-concepts between and within ability streams and how these patterns relate to the students' prior academic achievement. Analysis of variance was used as a general tool to address our hypotheses. In terms of between-stream differences (Hypotheses 1 and 2), a series of analyses of variance was performed to test stream differences in students' prior academic achievement and academic self-concepts. In terms of within-stream differences (Hypotheses 3–5), three sets of 3 (ability streams: high, middle, low) \times 2 (within-stream achievement levels: higher

and lower achievers) analyses of variance were performed. To this end, we categorized students within each stream into higher and lower achieving groups based on their achievement scores.

Methodologists (e.g., DeCoster, Iselin, & Galluci, 2009; Maxwell & Delaney, 1993), however, have recognized the potentially weakened statistical power in dividing a sample with a median split. In this context, DeCoster and colleagues (2009) advocated a feasible solution by categorizing participants into three groups (high, average, low) based on the key factor under consideration and comparing the two extreme groups (high and low). They also stated that data of the key categorizing factors must follow a symmetric distribution. On the basis of this recommendation, we first examined the skewness and kurtosis of student achievement scores before using them to classify students within each stream into higher, average, and lower achievers and compared academic self-concepts of the two extreme groups (the higher and lower achievers). In the first set, students within each stream were categorized as higher, average, and lower achievers according to their PSLE English scores by assigning the top 33.3% of students into the high-achieving group, the next 33.3% into the average-achieving group, and the lowest 33.3% into the low-achieving group. The same categorizing procedure was also conducted based on students' PSLE math and PSLE total scores in the second and third sets, respectively. Partial eta-squared (η^2) was used as an index reflecting the size of the observed differences, with η^2 values at 0.01 or lower categorized as small; η^2 values at around 0.06 categorized as moderate; and η^2 values at 0.08 or higher categorized as large (Cohen, 1988).

For the following substantive and methodological reasons, the use of analysis of variance in this study was methodologically more appropriate than regression techniques used in previous BFLPE investigations (see Marsh et al., 2008, for an overview), including the Liem and colleagues (2013) study. First, while the Liem and colleagues (2013) study relied on the use of multilevel regression modeling to reveal the BFLPE (i.e., the negative β coefficient representing the effect of context-average achievement on academic self-concepts), we used an analysis of variance as the present study focused on between- and within-stream differences in the *levels* (or *means*) of academic achievement and self-concept (Hypotheses 1–5). Furthermore, of particular theoretical interest is the examination of the contextual neglect bias hypotheses which are tested by assessing whether lower achievers in the high-ability stream have underestimated levels of academic self-concepts that are disproportionate to their relatively high levels of achievement in the school context, and whether higher achievers in the low-ability stream have overestimated levels of academic self-concepts that do not correspond with their relatively low levels of achievement in the overall school context (Hypotheses 4–5). Second, in relation to our purpose to examine the relation between academic achievement and self-concept of students within each stream, it is recognized that the variability of student achievement scores within each stream tends to be narrow and is relatively more so than the variability across streams which was the focus of the Liem and colleagues (2013) study. It has been noted that in BFLPE studies the extent of the variability of achievement scores across students in a given sample is likely to be positively associated with its importance (and statistical significance) in predicting academic self-concept (Marsh et al., 2008). Thus, performing multilevel regression taking into account the hierarchical nature of the data as done by Liem and colleagues (2013) was methodologically less viable in the present study. In support of the use of analysis of variance in the present study, DeCoster and colleagues (2009) stated, "... continuous and dichotomized indicators may be equally viable in the performance of extreme group analysis" (p. 358). This suggests that analyses involving

extreme groups (i.e., the analytic approach opted here) are likely to produce similarly meaningful results as regression techniques relying on continuous data.

RESULTS

Preliminary Analysis

We first examined bivariate correlations between students' achievement and their self-concept in the corresponding domain and level of specificity. Results showed that, for the whole sample, the relation between math achievement and math self-concept was moderate, $r = .37$ ($p < .001$). While this relation was of similar strength for students in the high- and middle-ability streams, $r = .38$ and $r = .39$, respectively ($p < .001$), it was slightly higher, $r = .43$ ($p < .001$) for students in the low-ability stream. Unlike in math, the relation between English achievement and English self-concept for the whole sample was relatively low, $r = .23$ ($p < .001$). Furthermore, the size of this relation varied more widely across streams, ranging from $r = .41$ for high-ability stream, $r = .36$ for middle-ability stream, to $r = .25$ for low-ability stream (all r s were significant at $p < .001$). The relatively modest relations between achievement and self-concept in these two specific domains may suggest that, at least for some students (or groups of students), their self-concept may not parallel their prior achievement. Furthermore, the fact that these relations, particularly in English, were more varied across streams suggests the potentially distinct patterns of achievement-self-concept relations across ability streams. Findings also indicated another pattern in terms of the general academic domain. The relation between general academic achievement and school self-concept was low and nonsignificant and this was true for both the whole sample, $r = .05$, and for individual streams ($r = .03$ for high-ability stream, $r = .08$ for middle-ability stream, to $r = .11$ for low-ability stream). Taken together, these findings provided preliminary bases to further assess the patterns of students' self-concepts in specific and general academic domains between and within ability streams as a function of their PSLE scores.

Between-Stream Differences on Academic Achievement and Self-Concepts

Support for the BFLPE as a function of ability stream (i.e., reversed effects on academic self-concepts of placement in high-ability and low-ability groups) should show that large stream differences in achievement (Hypothesis 1) are not accompanied with correspondingly large stream differences in academic self-concept, that is, stream differences in academic self-concepts are small (Hypothesis 2). To test these predictions, we conducted six one-way analyses of variance with stream (three groups: high-, middle-, and low-ability) as an independent variable and students' achievement and self-concept as dependent variables. As shown in Table 1, the results provided support to our hypotheses: although the main effects of stream on students' achievement were substantial (F s[2, 1064] = 1226.55–1518.94, η^2 s = 0.30–0.74), the main effects of stream on academic self-concepts were extremely small (F s[2, 1064] = 1.09–7.32, η^2 s < 0.01).

It is interesting to note that comparisons of the means in Table 1 suggest some anomalies. On the one hand, stream differences in students' achievement indicated that students in the high-ability stream had achievement scores that were significantly higher than those in the

TABLE 1
Comparisons of Academic Achievement and Academic Self-Concepts Across Ability Streams

	<i>Low-ability stream</i> (n = 174)		<i>Middle-ability stream</i> (n = 324)		<i>High-ability stream</i> (n = 569)		<i>Stream effect</i>	
	M	SD	M	SD	M	SD	F	η^2
Prior achievement								
PSLE English	4.20 ^a	0.98	4.56 ^b	0.77	5.38 ^c	0.65	226.55**	.30
PSLE math	3.76 ^a	1.35	4.06 ^b	1.03	5.43 ^c	0.73	326.25**	.38
PSLE total	113.74 ^a	30.44	172.62 ^b	19.96	214.15 ^c	19.10	1518.94**	.74
Self-concept								
English	3.85 ^a	1.32	3.68 ^a	1.26	3.46 ^b	1.25	7.32*	.01
Math	3.40 ^a	1.61	3.60 ^a	1.54	3.84 ^b	1.34	7.14*	.01
School	3.49	1.25	3.64	1.08	3.57	1.09	1.09	.00

Note. Different superscripts denote significant difference.

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

middle-ability stream who were, in turn, higher than the low-ability group. This pattern was apparent for both general and specific domains of academic ability. Despite these nuanced and logical between-stream differences in academic achievement, stream effects on academic self-concepts were somewhat unexpected: (a) in terms of ESC, students in the low-ability stream did not differ from those in the middle-ability stream, and students in these two lower streams were surprisingly higher than those in the high-ability stream; (b) in terms of MSC, although students in the high-ability stream were expectedly higher than those in the two lower ability streams, students in these two lower streams were not significantly different from each other, and (c) in terms of SSC, students in the three ability streams did not significantly differ from one another.

As described earlier, the placement of students in different ability streams was based on their overall PSLE performance (i.e., domain-general achievement). Thus, considering students' ESCs and MSCs based on their PSLE total scores is inconsistent with the specificity matching principle (Swann et al., 2007) because ESC and MSC are domain-specific self-evaluations whereas PSLE total is a domain-general achievement indicator. Furthermore, in light of the local dominance effect (Zell & Alicke, 2010), the lack of between-stream differences in academic self-concepts suggests that students may use their peers in the same stream—rather than peers in other streams—as a frame of reference. The extent to which this is the case, there is a need to examine the role of other students within each stream (same-stream peers) as a frame of reference for self-evaluations and to consider the relation between achievement and self-concept at the matching domain and appropriate level of specificity. As such, we now focus on within-stream examination.

Within-Stream Differences in Academic Achievement and Self-Concepts

We conducted a series of 3 (streams: high-ability, middle-ability, low-ability) \times 2 (achievement levels: higher achiever, lower achiever) analyses of variance with ESC, MSC, and SSC as dependent variables. As described earlier, based on their PSLE English, PSLE math, and PSLE total

scores, students within each stream were categorized into high, average, and low achievers and the analysis was then focused on comparing the extreme groups (i.e., the high and low achievers). A preliminary analysis demonstrated that the skewness and kurtosis of the each of the three sets of achievement scores for individual ability streams were low ranging between -1.00 and 1.32 for skewness and between -0.51 and 2.80 for kurtosis. Curran, West, and Finch (1996) suggest that skewness values lower than 2 and kurtosis values lower than 7 are within the cutoff for normal distribution. This finding indicates that the categorizing factors used in this analysis met the symmetric distribution prerequisite for conducting extreme group analysis (i.e., comparing the top and bottom thirds) as advocated by DeCoster and colleagues (2009).

Using PSLE English Scores for Grouping

Table 2 (Section A) reports the means of achievement and self-concept of the two extreme groups of students within each stream (i.e., the higher and lower achievers, with the average achievers omitted) based on their prior English achievement. The main effect of this categorization on the students' ESCs was significant, $F(1, 1061) = 75.89, p < .001$, with a large effect size of $\eta^2 = .11$. Examination of the means yielded a consistent pattern in that, within each stream, ESCs were higher for higher achievers than for lower achievers, suggesting that the categorization of high and low achiever based on English achievement did have a predictive effect on the students' ESCs. The finding however indicated a nonsystematic relation between this categorization and the students' MSCs and SSCs, suggesting that the categorization of students as high or low achiever in English did not have any predictive effect on the students' MSCs and SSCs. For example, MSCs and SSCs of the higher achievers in the middle-ability stream were lower than their lower achieving peers even though their PSLE math and PSLE total scores were higher than those of the lower achievers.

Using PSLE Math for Grouping

Table 2 (Section B) presents the means of achievement and self-concept of the two extreme groups of students within each stream (i.e., the higher and lower achievers, with the average achievers omitted) based on their prior math achievement. The main effect of this categorization on the students' MSCs was significant, $F(1, 1061) = 120.73, p < .001$, with a substantial effect size of $\eta^2 = .15$. Examination of the means showed a consistent pattern in that, within each stream, MSCs were higher for higher achievers than for their lower-achieving peers, suggesting that the categorization of high and low achiever based on math achievement did have a predictive effect on the students' MSCs. However, the finding showed a nonsystematic relation between this categorization and the students' ESCs and SSCs, suggesting that the categorization of students as high or low achiever in math did not have any predictive effect on the students' ESCs and SSCs. For example, higher achievers in each of the streams had lower ESCs relative to their lower achieving same-stream counterparts and higher achievers in the high-ability stream had lower SSCs than their lower-achieving peers.

TABLE 2
Comparisons of Academic Achievement and Academic Self-Concepts Within Ability Streams

	<i>(A) Using PSLE English scores for grouping</i>											
	Low-ability stream		Middle-ability stream		High-ability stream		Stream effect		Achievement effect		Stream × achievement effect	
	Low (n = 35)	High (n = 66)	Low (n = 20)	High (n = 173)	Low (n = 42)	High (n = 263)	F	η^2	F	η^2	F	η^2
PSLE (E)	2.71 (0.57)	5.17 (0.40)	2.90 (0.31)	5.20 (0.39)	3.90 (0.48)	6.00 (0.01)	352*	.54	3662*	.86	10*	.03
PSLE (M)	2.94 (1.21)	4.35 (1.28)	3.80 (1.28)	4.16 (1.04)	5.34 (0.85)	5.47 (0.69)	116*	.28	31*	.05	14*	.04
PSLE (T)	119.09 (42.48)	109.36 (22.81)	165.75 (9.77)	174.90 (23.78)	194.93 (25.43)	220.86 (16.99)	492*	.62	10	.02	18*	.06
ESC	3.34 (1.19)	4.21 (1.22)	2.81 (1.26)	4.06 (1.26)	2.50 (1.25)	4.02 (1.07)	5	.02	76*	.11	2	.01
MSC	3.29 (1.48)	3.38 (1.67)	3.85 (1.82)	3.35 (1.54)	4.49 (1.12)	3.51 (1.32)	6	.02	7	.01	4	.01
SSC	3.42 (0.99)	3.74 (1.23)	3.91 (1.40)	3.64 (1.07)	3.43 (1.09)	3.66 (1.05)	1	.00	0	.00	2	.01

	<i>(B) Using PSLE math scores for grouping</i>											
	Low-ability stream		Middle-ability stream		High-ability stream		Stream effect		Achievement effect		Stream × achievement effect	
	Low (n = 28)	High (n = 91)	Low (n = 87)	High (n = 116)	Low (n = 58)	High (n = 299)	F	η^2	F	η^2	F	η^2
PSLE (E)	3.61 (1.07)	4.54 (0.87)	4.43 (0.76)	4.70 (0.80)	5.14 (0.85)	5.40 (0.61)	89*	.21	44*	.06	7	.02
PSLE (M)	1.79 (0.42)	4.84 (0.83)	2.68 (0.47)	5.16 (0.37)	3.90 (0.31)	6.03 (0.18)	563*	.63	3868*	.85	36*	.10
PSLE (T)	132.21 (32.21)	109.44 (25.46)	165.86 (12.46)	176.06 (25.00)	200.50 (19.33)	218.89 (17.39)	577*	.63	1	.00	31*	.08
ESC	4.02 (1.27)	3.86 (1.38)	3.98 (1.09)	3.49 (1.30)	4.05 (1.25)	3.30 (1.24)	1	.00	14	.02	2	.01
MSC	2.40 (1.44)	3.95 (1.50)	2.91 (1.46)	4.34 (1.37)	3.03 (1.25)	4.32 (1.17)	5	.01	121*	.15	0	.00
SSC	3.45 (1.23)	3.58 (1.19)	3.55 (1.09)	3.78 (1.09)	3.78 (1.19)	3.56 (1.05)	1	.00	0	.00	2	.01

(C) Using PSLE total scores for grouping

	Low-ability stream		Middle-ability stream		High-ability stream		Stream effect		Achievement effect		Stream × Achievement Effect	
	Low (n = 53)	High (n = 59)	Low (n = 104)	High (n = 113)	Low (n = 185)	High (n = 196)	F	η^2	F	η^2	F	η^2
PSLE (E)	4.11 (0.85)	3.92 (0.93)	4.38 (0.83)	4.84 (0.71)	4.94 (0.67)	5.71 (0.49)	177*	.34	34*	.05	21*	.06
PSLE (M)	3.57 (1.17)	3.22 (1.20)	3.69 (1.21)	4.54 (0.72)	5.08 (0.78)	5.78 (0.50)	311*	.47	30*	.04	20*	.05
PSLE (T)	86.26 (6.46)	149.90 (22.57)	151.85 (17.81)	190.21 (11.39)	196.08 (22.70)	228.44 (6.12)	1600*	.82	1081*	.61	41*	.11
ESC	3.79 (1.38)	3.94 (1.15)	3.85 (1.24)	3.63 (1.29)	3.31 (1.35)	3.55 (1.18)	7	.02	0	.00	2	.01
MSC	3.11 (1.66)	3.59 (1.48)	3.66 (1.57)	3.43 (1.50)	4.00 (1.30)	3.71 (1.36)	7	.02	0	.00	3	.01
SSC	3.37 (1.39)	3.72 (1.12)	3.66 (1.10)	3.70 (1.03)	3.55 (1.10)	3.60 (1.06)	1	.00	2	.00	1	.00

Note. η^2 = partial eta-squared; ESC = English self-concept; MSC = math self-concept, SSC = school self-concept; shaded results denote means (and standard deviations) of achievement and self-concept scores in the matching domain and at the appropriate level of specificity; low and high groups represent the bottom 33% and the top 33%, respectively, of student achievement within each ability stream (see text).

* $p < .001$.

Using PSLE Total for Grouping

Table 2 (Section C) presents the means of achievement and self-concept of the two extreme groups of students within each stream (i.e., the higher and lower achievers, with the average achievers omitted) based on their general academic achievement. Unlike the domain-specific relations considered earlier, the main effects of this categorization on the students' SSCs, ESCs, and MSCs were not significant: $F(1, 1061) = 2.41, ns$; $F(1, 1061) = 0.27, ns$; and $F(1, 1061) = 0.03, ns$, respectively (all η^2 s $< .01$). Inspection of the SSC means in Table 2 showed that, within each stream, students with higher PSLE total scores appeared to have a higher SSC mean score than those with lower PSLE total scores—these differences, however, were not statistically significant. In terms of the students' ESCs and MSCs, however, an inconsistent pattern was found. This pattern showed, for example, higher achievers in the middle-ability stream had lower ESCs and MSCs than their lower achieving same-stream peers.

In summary, the three sets of within-stream analyses provided support to Hypothesis 3 that, within each stream, higher achievers had higher academic self-concepts than their lower-achieving same-stream peers only when achievement levels and academic self-concepts were considered in a matching domain and level of specificity. This pattern, however, was found to be stronger in specific than general performance domains. The findings also attested that, in an educational setting with a within-school ability streaming practice, the role of same-stream peers as one of the frames of reference that students may use in evaluating their academic accomplishments is more salient than that of peers in different streams. This saliency, however, may lead specific groups of students to overlook the relative position of their stream in the overall school context (i.e., the contextual neglect bias)—this is the focus of our subsequent analyses and interpretations.

Lower Achievers in the High-Ability Stream and Higher Achievers in the Low-Ability Stream

The following part further examines academic self-concepts of lower achievers in the high-ability stream and high achievers in the low-ability stream and tested the two contextual-neglect hypotheses. First, the use of academically stronger peers as a frame of reference may lead lower achievers in the high-ability stream to have disproportionately lowered academic self-concepts (Hypothesis 4). Second, the use of academically weaker peers as a frame of reference may lead higher achievers in the low-ability stream to have disproportionately heightened academic self-concepts (Hypothesis 5).

Table 2 (Section A) shows that ESCs of lower achievers in the high-ability stream ($M = 2.50$) were not only significantly lower than ESCs of their higher-achieving same-stream counterparts ($M = 4.02, p < .001$) but also significantly lower than ESCs of lower achievers in the low-ability stream ($M = 3.34, p < .01$) although the lower achievers in the high-ability stream had an average English achievement ($M = 3.90$) that was significantly higher than that of the lower achievers in the low-ability stream ($M = 2.71, p < .001$). This confirmed our Hypothesis 4 and provided evidence for a deleterious effect of same-stream comparison experienced by lower achievers in the high-ability stream. In contrast, higher achievers in the low-ability stream, with an average English achievement ($M = 5.17$), were found to have apparently overestimated ESCs ($M = 4.21$) which were not only significantly higher than ESCs of their lower-achieving same-stream peers

($M = 3.34, p < .01$) but also comparatively higher (albeit statistically nonsignificant) than ESCs of higher achievers in the high-ability stream ($M = 4.02$) with a significantly higher average English achievement ($M = 6.00, p < .001$). This finding provides strong support for Hypothesis 5, suggesting that the use of the achievement of same-stream peers who were academically weak resulted in overestimated ESCs. Thus, while lower achievers in the high-ability stream had apparently somewhat underestimated ESCs, higher achievers in the low-ability stream had somewhat heightened ESCs—a set of findings which were consistent with the contextual neglect bias predictions (Hypotheses 4 and 5).

A different pattern—but still consistent with the interplay of the specificity matching principle and the local dominance effect—was observed with MSC. As shown in Table 2 (Section B), lower achievers in the high-ability stream had significantly lower MSCs ($M = 3.03$) than that of their higher achieving same-stream peers ($M = 4.32, p < .001$), which was consistent with their relatively lower math achievement ($M = 3.90$) than their higher achieving same-stream peers ($M = 6.03, p < .001$). Unlike ESC-related findings reported earlier, MSCs of low achievers in the high-ability stream were higher, albeit statistically nonsignificant, than those of lower achievers in the middle-ability ($M = 2.91$) and low-ability ($M = 2.40$) streams. This was consistent with their higher math achievement relative to those of lower achievers in the middle-ability ($M = 2.68, p < .001$) and low-ability ($M = 1.79, p < .001$) streams. At the low end, higher achievers in the low-ability stream had a commensurate level of MSCs ($M = 3.95$) that was significantly higher than their lower achieving same-stream peers ($M = 2.40, p < .001$) and this supported by the fact that they had a significantly better overall math achievement ($M = 4.84$) than their mathematically weaker same-stream counterparts ($M = 1.79, p < .001$). Furthermore, MSCs of these students were also lower than those of higher achievers in the middle-ability ($M = 4.34$) and high-ability ($M = 4.32$) streams. This was consistent with their lower math achievement compared with those of higher achievers in the middle-ability ($M = 5.16, p < .001$) and high-ability ($M = 6.03, p < .001$) streams. Taken together, the levels of students' MSCs appeared to be parallel with the levels of their math achievement and, hence, these findings did not support the two contextual-neglect-bias predictions specified in Hypotheses 4 and 5.

Last, as shown in Table 2 (Section C), although the means of their general academic achievement (PSLE total) were significantly different from each other ($p < .001$), the six groups of students (i.e., higher and lower achievers in the three streams) did not significantly differ in their SSCs—not even between the higher and lower achievers in the low-ability stream with the mean difference of 0.35. This set of findings provided evidence for the weak predictive relation between performance and self-evaluation of ability in a general academic domain. Thus, as was found with MSC, we did not find support for the operation of the contextual neglect bias in the general academic domain (Hypotheses 4 and 5).

In summary, considering academic self-concepts of lower achievers in the high-ability stream and high achievers in the low-ability stream, the results provided mixed support for Hypotheses 4 and 5 and this support appeared to relate to the specificity and generality of the academic domain under consideration. Specifically, while the contextual neglect bias effect was more clearly apparent in students' self-evaluations of their English achievement, this phenomenon was not evident in students' evaluations of their math achievement and of their general academic achievement. In math, students' self-concept appeared to correspond with the level of their performance as considered based on more objective standards.

DISCUSSION

The present study aimed to examine the interplay between the local dominance effect (Zell & Alicke, 2009, 2010) and the specificity matching principle (Swann et al., 2007; see also Marsh & Craven, 2006) in the relations between academic self-concept and achievement among students in an ability streamed setting in Singapore. To this end, the study first examined between-stream differences in achievement and self-concept and it then examined the patterns of academic self-concepts of higher and lower achievers (i.e., the two extreme groups, omitting the average achievers) in each stream and ascertained the extent to which these patterns are domain specific (or otherwise). Key findings, interpretations, and their educational implications are subsequently discussed and proposed.

The Interplay Between the Local Dominance Effect and Specificity Matching Principle

The BFLPE research program (Marsh et al., 2008) has mapped out the contours of the BFLPE with samples comprising different levels of ability. The present study has extended this to a more detailed scrutiny of such an effect in the ability streamed setting, particularly within each ability group. The present study, too, has demonstrated the operation of BFLPEs by showing that, compared with students in the low-ability stream, more able students in the high-ability stream did not have more favorable academic self-concepts. However, we have further extended the BFLPE research by analyzing academic self-concepts of higher and lower achievers within each ability stream. In doing so, we considered specific and general academic domains. These within-stream differences in academic self-concepts and the domain specificity are issues that have been less systematically studied in prior BFLPE investigations.

In the present context, students are placed in one of the three core streams based on their prior academic performance and, as such, between-stream differences in achievement scores were expectedly large. Between-stream differences in academic self-concept, however, were small and did not reflect between-stream differences in achievement. This contrasting pattern may suggest that, in a streamed setting, same-stream peers constitute a more salient frame of reference than peers in different streams such that students primarily use the achievement of their same-stream peers as a benchmark in evaluating their academic accomplishments. Indeed, our within-stream examination indicated a consistent pattern (with larger effect sizes than between-stream differences) showing that, within each stream, students with stronger prior academic performance had higher academic self-concepts than their same-stream peers with weaker prior performance (Hypothesis 3). Consistent with the local dominance effect (Zell & Alicke, 2009, 2010), this finding suggests that, each of the ability streams (high-ability, middle-ability, or low-ability stream) provides a more salient contextual frame of reference than the larger school in informing the process of students' evaluations of their academic competence.

Furthermore, the pattern showing that higher achievers were stronger than lower achievers in their academic self-concepts was evident only when students' achievement and self-concept were considered in the matching academic domain and at the appropriate level of specificity. Hence, for example, although students capable in math had correspondingly higher MSCs than their same-stream peers less capable in the subject, these students' ESCs and SSCs were not necessarily higher as well. Similarly, while students who were strong in different academic subjects—as

indicated by their relatively high PSLE aggregate scores—had correspondingly higher SSCs than their same-stream peers who were academically weaker across different subjects, ESCs and MSCs of the former may not be necessarily higher than the latter. In support of the specificity matching principle (Swann et al., 2007), these results suggest that interpretations of self-evaluations of performance in the general domain should be done from a domain-general perspective. It would be inappropriate to interpret findings in domain-specific terms if the frame of reference is not within that specific domain. In other words, addressing self-concept issues in a nonmatching domain and at an inappropriate level of the hierarchy of academic self-concept structure would lead to misleading interpretations (Yeung et al., 2000). Taken together, these findings attested to the hypothesized interplay between the local dominance effect and the specificity matching principle in the formation of academic self-concepts in a streamed setting.

Lower Achievers in the High-Ability Stream and Higher Achievers in the Low-Ability Stream

Another set of key findings showed how students in different ability streams may use different frames of reference in evaluating their own academic competence. This was particularly apparent when we categorized students within each stream into higher, average, and lower achievers based on their English, math, or general academic achievement, and then compared the corresponding academic self-concepts of the top and bottom thirds (the two extreme groups within each stream). Findings indicated that, in English, lower achievers in the high-ability stream tended to have lower ESCs than what would be expected of them based on their actual English achievement, whereas higher achievers in the low-ability stream appeared to have higher ESCs than what would be expected of them based on their actual English performance. As explained earlier, these phenomena may be attributed to the dominant contextual role of each ability stream in informing students' evaluations of their academic competence such that students are prone to a contextual neglect bias by overlooking the relative standing of their stream in the overall school context (Zell & Alicke, 2009, 2010). The finding that the higher achievers in the low-ability stream appeared to have higher than expected ESCs relative to their actual achievement is also consistent with prior studies showing that low-ability students tend to be too optimistic about their learning skills relative to their actual learning performance (i.e., miscalibration). Klassen (2007), for example, found that early adolescent students with learning disabilities miscalibrated by overestimating their spelling performance by 52% and their writing performance by 19% whereas those without learning disabilities were relatively more accurate in the estimation of their performance. Unlike ESC, the level of students' MSCs appeared to logically correspond with their math proficiency and the stream level they belonged to. This finding shows that MSC may be less affected by external frames of reference potentially leading to the local dominance effect and, by implication, the contextual neglect bias as well. Thus, scrutiny of the patterns of academic self-concept of the lower achievers in the high-ability stream and of the higher achievers in the low-ability stream provided partial support for Hypotheses 4 and 5.

The distinct patterns observed on MSC and ESC are interesting and may indicate that students form their academic self-concepts differently in different academic domains. The difference in this self-evaluation mechanism may relate to the extent to which the domains under evaluation vary in the definiteness or concreteness of their evaluation standard. In math, where there are often more definite solutions and answers to problems than in English, literature, or other social

sciences, the standard that students use to evaluate their competence may be more definite and more concrete. In this regard, students may tend to rely on task-based criterion standards (e.g., answering 90% of test problems correctly) rather than normative standards (e.g., achievement of their same-context peers) as a frame of reference for their self-evaluations. This finding is apparently consistent with Liem and colleagues' (2013) results showing that the negative effect of stream-average achievement on ESCs ($\beta = -.62$) was comparatively stronger than the positive effect of individual students' achievement on ESCs ($\beta = .54$). The reverse, however, was true in math: the positive effect of individual students' achievement on MSCs ($\beta = .57$) was relatively stronger than the negative effect of stream-average achievement on MSCs ($\beta = -.40$)—a set of findings that apparently reflected students' relatively stronger reliance on a normative standard as a frame of reference in evaluating their English competence and their relatively stronger use of prior achievement (i.e., objective criteria) as a comparison standard in judging their math competence. Taken together, while the BFLPEs were present and tend to generalize across math and English, it appears that students are relatively less engaged in the social comparison process underpinning the BFLPE—and, by implication, the local dominance and contextual neglect bias—in evaluating their competence in math than they are in English.

Consistent with the specificity matching principle (Swann et al., 2007), students' perceptions of their competence in the general academic domain (i.e., SSCs) were not found to be systematically associated with their general academic performance. This is hardly surprising because, compared with students' evaluations of their math or English abilities, SSC is a broader and more all-encompassing form of self-evaluations in which there are different academic subjects that the students have to judge in order to come up with these self-evaluations. SSC may not be as useful as ESC or MSC as a diagnostic tool if a student, for example, has a high ESC and a low MSC. This may further be compounded by the relative importance/salience attributed by students to different academic subjects such that they attribute different weights to each of the subjects when rating their SSCs (Hardy & Moriaty, 2006). All these suggest a plausible explanation to the nonsignificant differences in SSCs between higher and lower achievers within each stream.

Implications for Educational Interventions

Development and maintenance of positive academic self-concepts is one of the key objectives of educational systems worldwide (Organisation for Economic Cooperation and Development, 2003), including the Singapore education system with one of its desired outcomes to produce students who “believe in their ability” (Singapore Ministry of Education, 2009). The negative BFLPE and its underlying invidious social comparisons (Huguet et al., 2009) are, therefore, a factor that impedes the promotion of positive academic self-concepts. While we recognize the potential benefits of ability streaming, particularly for the implementation of instruction which would otherwise be too fast (or too slow) for some students of diverse ability levels in a non-streamed setting (Ireson & Hallam, 2001), our findings hold important implications for developing strategies about how to counter the BFLPE and, at the same time, promote academic self-concepts of students in the ability stream setting.

At a more general level, first, it is important for teachers to seek to downplay engagement in social comparisons of students in all ability streams. This could be done by de-emphasizing competition which tends to reward only a relative minority of students and potentially dampens

academic self-concepts of the majority of students who do not perform as well as the most capable minority (Nicholls 1989). To this end, teachers may focus on criterion-based assessments and feedbacks in evaluating students (see Marsh et al., 2008) and encourage students to adopt mastery goals emphasizing the development of skills and the acquisition of knowledge (Elliot, Murayama, & Pekrun, 2011). Equally important, teachers also need to develop a warm and supportive classroom climate that appreciates the unique strengths of individual students. This would develop students' senses of encouragement and empowerment which promote their positive academic self-concepts. Second, given the longitudinal reciprocal effect between self-concept and achievement (Marsh & Craven, 2006), interventions aimed at promoting students' academic self-concepts should aim at developing their learning skills effective in bringing about changes in the students' actual achievement. Furthermore, our findings showed that the relations between academic achievement and self-concept in specific domains (English, mathematics) were stronger than that in a general domain. Consistent with a meta-analysis by O'Mara and colleagues (2006), this finding supports the notion that the promotion of academic achievement and self-concept would be more effective when conducted in specific academic domains than in the general domain.

At a more specific level, students in different ability streams appear to need interventions with different foci. While all the different achievement groups in our study should learn, and be encouraged, to see their achievement from a more objective perspective, the groups who are most at-risk appear to be the lower achievers in the high-ability stream and the lower achievers in the low-ability stream. In this regard, applied interventions seeking to promote academic self-concepts of these two groups of lower-achieving students can be designed to provide them with greater opportunities to experience mastery and successful learning situations. This can be done, for example, by assigning students an adequate amount of assisted practice (i.e., worked examples), allowing students to deliberately and purposefully practice the skills and knowledge they are to learn (i.e., monitored independent practice), and setting homework and tests with a gradual level of difficulty. These mastery and success experiences can then be validated and affirmed by the teachers through praise, feedback, and encouragement such that the students' academic self-concepts are likely to improve as well (O'Mara et al., 2006). For the lower achievers in the low-ability stream—arguably, the most academically challenged group, it may also be fruitful to introduce them to skill-oriented programs—such as those emphasized in co-curricular activities—to provide them with opportunities to develop unique strengths of their interests, particularly in nonacademic areas (e.g., the arts, sports, leadership). By doing so, they are more likely to gradually build their personal capacity and would develop a stronger sense of school belongingness or attachment which is not only an important outcome in itself but also an affective basis of student academic success (Fredricks & Eccles, 2005; Liem & Martin, 2011). As for the higher achievers in the low-ability stream, teachers need to be cautious of the negative risk of the inflated level of academic self-concepts of this group of students. Although positive academic self-concept is a desirable outcome in itself and potentially leads to better achievement, when students' self-evaluations of their academic ability are overestimated and do not correspond with their actual ability, overestimated academic self-concepts may lead students to set inappropriate academic goals which in turn lead to reduced effort and engagement (Dunlosky & Rawson, 2012; Vancouver, Thompson, Tischner, & Putka, 2002). Thus, it is important that teachers monitor and guide these students to ensure that the students' optimistic views of their academic competence give rise to adaptive academic processes and outcomes.

Limitations and Future Directions

The present study has shown the importance of considering the local dominance effect and the specificity matching principle in understanding academic self-concepts of students in an ability streamed context. There are, however, limitations important to consider when interpreting findings and directions for future research. First, the present sample came from a culturally competitive society with high expectations of academic success. It is also important to note that the sample was drawn from only seven schools. Hence, further research should draw samples from a larger number of schools and culturally different contexts such that generalizability of the findings can be enhanced. Second, the use of PSLE scores as an objective measure of achievement is aligned with the recommendation by BFLPE researchers (Marsh et al., 2008) as these scores are directly comparable over all students across different streams and schools. However, this set of achievement indicators were derived from a high-stakes national examination perceived to be extremely important by the students and this may have affected the associations between achievement and academic self-concepts observed in this study. Hence, there is a need to extend the generalizability of our findings by using different types of achievement indicators as predictors of academic self-concepts. Furthermore, consistent with the empirically substantiated view of the use of self-reported academic achievement for research purposes (Dickhäuser & Plenter, 2005; Kuncel et al., 2005), the use of self-reported grades in the present study was supported by evidence of its high reliability. Still, Kuncel and colleagues (2005) recommend replicating and validating findings based on self-reported grades with actual grades obtained from school records. Future research should pursue this as one of its main aims. Third, it is noteworthy that there are other factors unmeasured in this study that may play a role in academic self-concept formations. These include contextual factors such as parental and teacher expectations or classroom instruction and assessment modes. Ireson and Hallam (2001), for example, found that teachers typically prefer to teach high-ability groups to low-ability groups and have higher expectations of the former than the latter. Furthermore, intraindividual attributes, particularly self-enhancement and self-protection motives, may also account for academic self-concept differences between above-average and below-average students (Möller & Pohlmann, 2010). It is clear that future studies should examine, or control for, factors that may play a role in academic self-concepts of students with different academic proficiencies. Last, in the interpretation of the present findings, we speculate that the extent to which external frames of reference or objective evaluation standards in forming students' academic self-evaluations may depend on the curriculum domain. Thus, it may be useful for future research to replicate our findings by investigating between-stream and within-stream differences in, for example, self-efficacy which involves a stronger reference to an expected criterion standard than to a normative standard. This, too, is an area for future investigations.

CONCLUSION

The study examined the extent to which the interplay between the local dominance effect and the specificity matching principle operates in the formation of students' academic self-concepts in different ability streams. Consistent with the BFLPE model, although stream differences in academic achievement were large, stream differences in academic self-concepts were negligible.

In each stream, students' academic self-concepts corresponded with the levels of their prior academic achievement only when they were considered in the matching domain and at the appropriate level of specificity. Furthermore, given the contrasting levels of frames of reference used, there was some evidence for disproportionately lowered English self-concepts of lower achievers in the high-ability stream and disproportionately heightened English self-concepts of higher achievers in the low-ability stream. Students' math self-concepts were found to correspond with the level of their performance as considered based on more objective standards, whereas students' school self-concepts were not significantly related to their general academic performance. Collectively, the findings hold theoretical and practical implications for researchers and practitioners to consider the interplay of the local dominance effect and the specificity matching principle in the formation of academic self-concepts of students in ability streamed contexts.

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