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Running Head: Early Transition and Academic Self-concept

How an early transition to high-ability secondary schools affects students' academic self-concept: Contrast effects, assimilation effects, and differential stability

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Abstract

This study examined the operation of contrast and assimilation effects, and the development of academic self-concept of students in the education system of the German federal state Berlin. One group of students experienced an early transition to high-ability secondary schools while the other group experienced the regular transition after sixth grade. The early transition was found to bear an assimilation effect on academic self-concept which was stronger than the contrast effect immediately after early transition but weaker at the end of the first school year after early transition. The early transition did not affect the normative stability of academic self-concept between two measurement points. Students with an early transition displayed higher levels of academic self-concept at both measurement points but a more substantial decline in academic self-concept than students experiencing regular transition. The findings are discussed in the context of the debate on tracking and acceleration practices in education systems.

Key words: academic self-concept, contrast effect, assimilation effect, social comparison processes, ability grouping

Academic self-concept, defined as a student's perception of his or her academic competence, constitutes a prominent construct which has been investigated in numerous studies (e.g., Marsh & Craven, 1997; Marsh & Craven, 2006). Academic self-concept has been found to facilitate a wide range of desirable outcomes. For example, academic self-concept has been demonstrated to share positive reciprocal relations with academic achievement (Marsh & Craven, 2006), and has been found to be related to interest (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005), motivation (Skaalvik & Rankin, 1995), attributions of success and failure (Marsh, 1984), aspirations (Nagengast & Marsh, 2012), and effort (Trautwein, Lüdtke, Schnyder, & Niggli, 2006). Academic self-concept thus plays a pivotal role in educational psychology, as the enhancement of academic self-concept might contribute to the promotion of other desirable outcomes.

1. Formation of Academic Self-Concept

Social comparison processes are known to play a pivotal role in the formation of academic self-concept (e.g., Marsh, 1990; Marsh & Craven, 2002; Möller, Pohlmann, Köller, & Marsh, 2009) which were found to entail two effects: contrast and assimilation effects. The application of social comparison processes in shaping their academic self-concepts was found to lead to two different effects: contrast and assimilation effects.

1.1 Contrast Effects

Contrast effects on students' academic self-concept have been investigated primarily in the context of research on the big-fish-little-pond effect (BFLPE; e.g., Marsh, 1987). In this case, social comparison processes are assumed to yield differential effects on the individual (student) level and the group or context (class-average or school-average) level. Given that students compare their own achievement in one school subject with the achievement of other students in the same subject, high achievement leads to high levels of academic self-concept on the individual level. In addition, students compare their own achievement with the average achievement of the group to which they belong (within-group comparison; Liu, Wang, &

Parkins, 2005), leading to a negative effect of achievement on academic self-concept on the context level. Equally able students display low levels of academic self-concept in high-ability contexts, but high levels of academic self-concept in low-ability contexts. A student who is consistently confronted with better achieving students (i.e., with high class-average or school-average levels of achievement) might develop a poor academic self-concept, as this student always perceives his or her own accomplishments to be inferior to those of the other students. Conversely, the same student might perceive his or her accomplishments as above average in low-ability contexts, strengthening his or her academic self-concept. The BFLPE has been validated empirically in numerous studies (Marsh & Craven, 2002; Marsh, Köller, & Baumert, 2001; Marsh et al., 2008), demonstrating its generalizability across countries and cultures (Marsh & Hau, 2003; Nagengast & Marsh, 2012; Seaton, Marsh, & Craven, 2009; Wang, 2013), subjects (general school: Marsh & Hau, 2003; math: Seaton et al., 2009; science: Nagengast & Marsh, 2012), gender (Marsh, Trautwein, Lüdtke, Baumert, & Köller, 2007), and achievement levels (Marsh & Craven, 2002; Marsh et al., 2007; Marsh & Hau, 2003; Seaton et al., 2009).

1.2 Assimilation Effects

Although the contrast effect assumes that social comparison processes made at the context level yield negative effects on students' academic self-concept, social comparison processes operating on the context level also might entail positive consequences on students' academic self-concept, which are known as assimilation effects. In this case, students compare the achievement of the group to which they belong (i.e., the average achievement of the school or class they attend) with the achievement of other groups (i.e., the average achievement of other schools or classes) irrespective of their own accomplishments within the group (across-group comparison; Liu et al., 2005). Thus, belonging to a high-ability group might enhance students' academic self-concept simply because students bask in the glory of their high-ability learning environment and might infer that they, as part of a high-

achievement group, individually also possess a high level of ability leading to a higher level of academic self-concept (Marsh, Kong, & Hau, 2000). Thus, contrast and assimilation effects are assumed to yield simultaneous but opposite impacts on students' academic self-concept. While the assimilation effect assumes a positive influence of a high average achievement of the learning environment on students' academic self-concept, the contrast effect assumes a negative impact. Thus, belonging to a prestigious and high-ability learning environment might yield both positive and negative influences on students' academic self-concept.

1.3 Juxtaposing Contrast and Assimilation Effects

While research has provided consistent support for the operation of contrast effects (Marsh et al., 2008), conclusions regarding the existence and relative strength of the assimilation effect are still mixed. The assimilation effect has been conceptualized as the weaker effect in the joint operation of contrast and assimilation effects. Marsh et al. (2000) found positive effects of students' perceived school status on students' academic self-concept in a longitudinal study with students in Hong Kong. However, this assimilation effect was accompanied by a stronger negative contrast effect as higher school-average achievement led to lower academic self-concept. Consequently, the BFLPE has been conceived as the net effect of counterbalancing positive assimilation and negative contrast effects (see also Trautwein, Köller, Lüdtke, & Baumert, 2005).

Recent research findings, however, have indicated that the existence and strength of assimilation effects might depend on the salience of students' group membership. Strong assimilation effects are expected if group membership is highly visible in that the students are constantly well aware of the relative standing and prestige of the group to which they belong. In addition, assimilation effects are facilitated if students have regular opportunities to interact with students of other ability groups and therefore are permanently reminded of the relative standing of their own group (Trautwein, Lüdtke, Marsh, Köller, & Baumert, 2006). This conjecture matches findings from the study of Köller, Schnabel, and Baumert (2000)

conducted in the high-ability track of upper secondary schools in Germany where students choose between advanced and regular math courses. Only a minority of the students opt for advanced courses. Participation in advanced math courses was found to yield a positive effect on students' math self-concept, supporting an assimilation effect which was found to be stronger than the negative effect of school-average math achievement (i.e., the contrast effect). In the study of Preckel and Brüll (2010) with fifth-grade students in high-ability track secondary schools in Germany, a subsample of students attended special classes for gifted students within their schools. These students were pre-selected based on their IQ, school grades, parents' suggestions, and teachers' evaluations. Attending special classes for gifted students was found to yield a positive effect on math self-concept. This assimilation effect ($\beta = .63$) was accompanied by a negative contrast effect ($\beta = -.72$) of similar size and so this study evinced evidence of a strong assimilation effect which was not inferior to the contrast effect.

Recently, Chmielewski, Dumont, and Trautwein (2013) investigated the effects of three types of tracking (i.e., between-school tracking, within-school tracking, and course-by-course tracking) on students' academic self-concept. Assimilation effects, which were even stronger than contrast effects, could be found in course-by-course tracking systems while no assimilation effects could be demonstrated in within-school and between-school tracking systems. In course-by-course tracking systems, students are allocated to different groups for certain subjects within one school, so the same students can attend high-ability and low-ability courses for different subjects in the same year within the same school. This characteristic might enhance the operation of assimilation effects, as students are constantly reminded whether they attend a high-ability or low-ability course in a specific school subject, and become thus aware of their standing relative to the other students of their grade level.

In a longitudinal study conducted within the education system in Singapore, Liu et al. (2005) demonstrated temporal variations in the occurrence and relative strength of

assimilation effects. Assimilation effects were apparent immediately after the students had been streamed into different ability tracks within secondary schools. Accordingly, students attending the higher-ability track demonstrated higher levels of academic self-concept than students from the lower-ability track. At the end of the third year of secondary school, the assimilation effect was replaced by a contrast effect, as higher-ability track students displayed lower levels of academic self-concept relative to lower-ability track students. The authors conjectured that the segregation of students into different ability tracks was highly visible immediately after the transition to secondary school, facilitating the assimilation effect. With time, students might narrow their focus to the ability track they attend and rely on within-group comparisons leading to the predominance of contrast effects.

So far, support for strong assimilation effects which can outweigh contrast effects has been demonstrated for tracking or ability grouping practices taking place within the same school or school type. The aim of this study is to investigate contrast and assimilation effects in the education system of the German federal state of Berlin to gain insight into their co-occurrence when students attend different school types.

2. The Education System in Berlin

The education system in Berlin is exceptional in Germany as there are two ways for the transition from elementary to secondary school. The majority of students in Berlin pursue the regular school career and stay at elementary school until grade 6 to transfer to secondary school between grades 6 and 7. The transition to secondary school after grade 6 goes along with an ability tracking procedure. As in all other federal states in Germany, students change to the high- (academic), middle- (intermediate), or low-ability tracks of secondary school depending on their accomplishments in elementary school. A minority of students in Berlin (approximately 8% each school year) transfer to secondary school already upon completion of grade 4. These students change to high-ability track schools which reputedly have a high average standard of ability and are further characterized by specific profiles or programs.

Some schools offer bilingual programs, others are characterized by a particular focus on physical education or music. Students are selected on the basis of their achievement during elementary school. In addition, at some schools, tests are administered or interviews conducted to ensure that the selected students match the schools' specific profiles or programs. Hence, students in Berlin transferring to secondary school already after grade 4 differ from the other students in Berlin in that they (1) experience an uncommonly early transition, (2) attend a high-ability school characterized by a specific thematic profile or program, (3) outperform students with regular transition with regard to their achievement, and (4) belong to a minority group of students within the education system in Berlin, selected on the basis of a competitive process. Thus, as they reach grade 5, students in Berlin are divided into a small prestigious and high-ability subgroup (with an early transition to secondary school) and a larger group of students who follow the regular transition after grade 6 (Baumert, Becker, Neumann, & Nikolova, 2009).

Given the status differences between these two groups of students, belonging to the subgroup of students eligible for the early transition might affect students' academic self-concept in a positive way (i.e., resulting in an assimilation effect). As previously conjectured, strong assimilation effects are likely when students are highly aware of their group membership and when their allocation to more or less prestigious groups has just happened. Assimilation effects are supposed to weaken over time when students have attended schools of different status and ability levels for a while, because they have then become used to and have accepted their group membership (Liu et al., 2005; Trautwein, Lüdtke, Marsh et al., 2006).

Besides its impact on the operation of contrast and assimilation effects, the idiosyncratic education system in Berlin also might affect the development of students' academic self-concept. Mortimer, Finch, and Kumka (1982) define four approaches to the study of self-concept development (i.e., normative stability, level stability, structural stability,

and ipsative stability), two of which (normative stability and level stability) are further considered in the present study. *Normative stability* refers to the consistency of interindividual differences or rank orders in the level of self-concept. It is commonly tested by the correlation between self-concept measured by the same instrument on two different occasions. In case of low normative stability, individuals change their relative positions within their reference group. This might happen if individuals with high levels of self-concept at the first measurement point display low levels at the second measurement point or if individuals with formerly high levels of self-concept demonstrate low levels later on. Conversely, if individuals retain their ranks with respect to their individual self-concepts within a given population, normative stability is high. *Level stability* refers to changes in the mean level of self-concept which is independent from normative stability. For example, low level stability (i.e., decreasing mean levels) accompanied by high normative stability occurs if the mean levels of all individuals of a certain population decline but the rank order within the considered population remains stable. In this case, individuals with relatively higher initial levels of self-concept still have higher levels relative to the other individuals within their reference group at the second measurement point although their absolute levels are lower at the second than at the first measurement point.

The experience of an early in contrast to a regular transition to secondary school in Berlin might affect the *normative stability* of students' academic self-concept. Students experiencing an early transition might display lower normative stability of academic self-concept than students not experiencing an early transition. Subsequent to the early transition, students might experience an essential shift in their reference group used for social comparison processes in the formation of academic self-concept. Students selected for early transition might display above-average achievement leading to high levels of academic self-concept before transition. The early transition clusters high-ability students from different elementary schools so that some of the formerly high-achieving students will perceive

themselves as below-average, leading to a decline in academic self-concept. By contrast, the academic self-concept of students who are still above-average after the early transition to the high-ability secondary schools might remain stable or even improve. Thus, whereas some students might maintain their ranks in the distribution of academic self-concept levels after the early transition, other students might experience a shift from an initial positive academic self-concept to a more negative one resulting in changes in students' rank orders.

Besides normative stability, students in Berlin with and without the experience of an early transition might differ in their *mean level stability* of academic concept. In grade 5, academic self-concept might decline more substantially for students who have experienced an early transition. After the early transition to high-ability secondary schools between grades 4 and 5, students might experience higher evaluation standards and shifting frames of reference for self-concept formation leading to a decrease in academic self-concept. Correspondingly, Liu et al. (2005) showed that students' academic self-concept worsened during the first three years at secondary school, and that this was more pronounced for the students in the high-ability track.

3. The Present Investigation

The aim of the present study was to examine and compare the academic self-concept of two groups of students in Berlin: One group experiences an early transition to high-ability secondary schools after grade 4, while the other group stays in elementary school until grade 6. We focus on three research questions.

1. Does the early transition in the education system in Berlin elicit simultaneous assimilation and contrast effects on students' academic self-concept? What is the relative strength of assimilation and contrast effects at two different points in time?

Because eligibility for the early transition to high-ability secondary schools is prestigious and based on a selective procedure, it might lead to a positive assimilation effect on students' academic self-concept. At the same time, the high average achievement level of

secondary schools attended after early transition might lead to a negative contrast effect. Given that the status differences between students with and without the experience of an early transition might be particularly visible immediately after the allocation process (i.e., at the beginning of grade 5), assimilation effects might be stronger at this point and might weaken in due course (Liu et al., 2005; Trautwein, Lüdtke, Marsh et al., 2006).

2. Do students with and without the experience of an early transition differ with respect to the normative stability of academic self-concept?

Students experiencing an early transition might exhibit lower normative stability of academic self-concept as changes in students' reference group for self-concept formation might be more likely after an early transition.

3. Do students with and without an early transition differ with respect to the mean level stability of academic self-concept?

Due to higher achievement standards and stricter frames of reference in high-ability secondary schools attended after the early transition, students might suffer from a decline in academic self-concept after the early transition while students remaining at elementary school might exhibit stable levels.

4. Method

4.1 Sample and Design

The data analyzed in this study originates from the Survey of Reading and Mathematics Comprehension: Development from Grades 4 to 6 in Berlin (ELEMENT). The ELEMENT study is a longitudinal study that examines the learning progress of 4^{th} to 6^{th} grade students in the school system of Berlin. In essence, the study targets the issue of whether students changing from elementary school to the high-ability track of secondary school (Gymnasium) after grade 4 would have a more favorable development of cognitive and non-cognitive outcomes than students who remain at elementary school until the end of grade 6.

The sample of this study comprised two groups of students. Corresponding to the majority of students in Berlin, one group of students [henceforth referred to as elementary school students, $N = 3168$ (51.5% male)] followed the regular school career of the education system in Berlin. Hence, they stayed in elementary school until the end of grade 6 and changed to secondary school between grades 6 and 7. The other group of students [($N = 1757$ (47.8% male)] represented the minority of students in the education system in Berlin as they quit elementary school earlier and changed to the high-ability track of secondary school (Gymnasium) after grade 4 (henceforth referred to as secondary school students).

The data of the complete ELEMENT study were gathered at three measurement points. For the elementary school students, the first measurement point (t1) took place at the end of grade 4; for the secondary school students, t1 took place at the beginning of grade 5, hence immediately after their early transition to the high-ability track of secondary school. The second (t2) and third (t3) measurement points were realized at the end of grades 5 and 6 for both groups. On each measurement occasion, a wide range of variables were assessed including students' achievement and motivation. Since academic self-concept was assessed at t1 and t2 only, we considered only these two measurement points in the present study.

4.2 Measures

From the motivational measures included in the ELEMENT study, three items were selected for depicting students' academic self-concept. These items asked for students' self-perceived competence in the academic domain (e.g., "I am not as gifted as other students"). For each item, the students had to indicate the extent to which they agreed to the statement on a 4-point Likert-type scale. For the analyses, all items were coded so that high scores described high levels of self-concept. The reliability estimates for the scales used for measuring students' academic self-concept were adequate at both measurement points: t1: $\alpha = .772$; t2: $\alpha = .805$.

Students' achievement was measured with reading comprehension tests. Since reading comprehension has a facilitative function for accomplishment in many school subjects and is a domain-spanning basic skill (Meneghetti, Carretti, & De Beni, 2006; Savolainen, Ahonen, Aro, Tolvanen, & Holopainen, 2008), reading comprehension seems to be an appropriate achievement measure. Accordingly, students' reading comprehension achievement score displayed a substantial correlation to students' grade point average ($r = .640$, $p < .01$) in this study. Furthermore, reading comprehension achievement showed a high correlation to students' school grade in German ($r = .624$, $p < .01$), which was demonstrated to be the most relevant achievement predictor of eligibility for early transition (Baumert et al., 2009).

At t1, the elementary school students were asked to read two fictional texts and one non-fictional text on their own and to respond to open and multiple-choice questions afterwards. The secondary school students got one fictional and two non-fictional texts. At t2, elementary and secondary school students were given the same texts (two fictional texts, one non-fictional text, and one instruction text) with corresponding questions. Thus, reading comprehension achievement was measured in a broad way, as different types of texts were used. The texts were assessed regarding curricular validity beforehand, and they have been used in other large scale studies on reading achievement [e.g., Progress in International Reading Literacy Study (PIRLS)].

Students' responses on the reading comprehension tasks were analyzed with item response theory methods using weighted likelihood estimates (WLEs; Warm, 1989) in the ConQuest software (Wu, Adams, & Wilson, 1998). Among the items used at t1 and t2, 17 items were used as anchor items to establish the equivalence of the reading comprehension scales. The scales for reading comprehension achievement were scaled with $M = 100$ and $SD = 15$ (for further information see Lehmann & Lenkeit, 2008; Lehmann & Nikolova 2005a, 2005b).

4.3 Statistical Analyses

All analyses were conducted with the statistical package Mplus 7.0 (Muthén & Muthén, 1998-2012) applying the maximum likelihood (ML) estimator. Missing data of reading comprehension achievement were handled by multiple imputation by chained equations (MICE, e.g., White, Royston, & Wood, 2011) using a wide range of auxiliary variables including students' school grades in the first school terms of grades 4 and 5, students' final school grades in grade 6, class-average reading achievement, students' academic motivation including interest and academic self-concept, as well as socio-economic background variables. Five imputed data sets were created. The analyses involving reading comprehension achievement were conducted with the Mplus option (type = imputation) that combined the parameters of each of the five imputed data sets. Missing values on the academic self-concept items (19.92 % for the total sample) were estimated by the *Full Information Maximum Likelihood* (FIML) estimation implemented in Mplus (see Enders, 2010 for further details).

We began the statistical analyses by conducting confirmatory factor analyses (CFA) to test the integrity of the scales used for measuring academic self-concept at t1 and t2. For this purpose, we stated a model integrating one factor of academic self-concept at t1 and one factor of academic self-concept at t2 which were defined by the academic self-concept items used at the respective measurement points (Model 1 in Table 1). Correlated uniquenesses between parallel-worded items applied at both measurement points were integrated in all models to account for the method artifact associated with repeatedly used items (Marsh & Hau, 1996). To test the applicability of the self-concept measures for longitudinal analyses, we proceeded with tests of measurement invariance across time. Measurement invariance across time ensures that the constructs of academic self-concept assessed at both measurement points (t1, t2) have the same underlying meaning (Meredith, 1993). For this purpose, Model 2 assumed invariant factor loadings (also known as weak measurement invariance; Meredith, 1993) across time. Model 3 additionally stated invariant item intercepts at t1 and t2 (strong

measurement invariance; Meredith, 1993) which have been conceptualized as the precondition to meaningful tests of mean level differences (i.e., mean level stability).

To examine the operation and relative strength of contrast and assimilation effects, we adhered to the Mplus 7.0 User's Guide (Muthén & Muthén, 1998-2012) for modeling context effects (also see Raudenbush & Bryk, 2002, Wang, 2013). For both measurement points (Model 4 for t1, Model 5 for t2), we stated multilevel path models in which academic self-concept was predicted by students' individual reading comprehension achievement on the within-level and by class-average reading comprehension achievement on the between-level. This part of the model depicted the contrast effect which was finally estimated by defining a new parameter as the difference between the regression coefficients for the effects of achievement on academic self-concept resulting from the within and between models. An assimilation effect was also modeled in Models 4 and 5 as students' school type (0 = elementary school; 1= secondary school) was integrated as a between-level variable predicting academic self-concept. All parameters were standardized, allowing comparison of the resulting contrast and assimilation effects.

The next series of analyses focused on whether the two groups of students differed in the normative stability of academic self-concept. For this purpose, we used multi-group invariance models (e.g., Meredith, 1993) in which students' school type (elementary school vs. secondary school) was utilized as a grouping variable and certain model parameters were successively restricted to be equal across groups. In a first multi-group model (Model 6), the same factor pattern (the same number of factors defined by the same subset of items; configural invariance) was assumed for elementary and secondary school students. Model 7 extended this model by stating equal-sized factor loadings across groups (weak measurement invariance), and Model 8 simultaneously assumed invariant factor loadings and item intercepts (strong measurement invariance). In Model 9, we tested the invariance of factor variances. In the case of invariant factor variances, tests of invariant factor covariances

(Model 10) are equivalent to tests of invariant factor correlations (Brown, 2006; Marsh, 1994) which themselves served to probe whether both groups of students differed in their normative stability of academic self-concept (i.e., in the correlation between academic self-concepts measured at t1 and t2).

To examine whether the two groups of students displayed differential mean level stability of academic self-concept, we applied latent change models (McArdle, 2009) which also are referred to as latent difference models (Little, Bovaird, & Slegers, 2006) or true change models (Steyer, Eid, & Schwenkmezger, 1997). In this approach, the variance of the variable measured at the second measurement point is decomposed into the initial value and a difference score: state2 = 1*state1 + 1(state2-state1). Hence, the difference score depicts the change of a variable between the two measurement points. As a latent variable, the difference score can function as an endogenous variable that is itself predicted by other variables. Students' school type was modeled as a predictor of the difference score for testing whether elementary and secondary school students differed in their development of self-concept between the two measurement points.

Since there is no ultimate criterion for assessing the fit of models with latent variables, researchers are advised to consider a wide range of goodness-of-fit indices (Marsh, Hau, & Wen, 2004). Thus, we scrutinized the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). Values above .90, but preferably above .95, for the CFI and TLI represent a good model fit (Hu & Bentler, 1998). With regard to the RMSEA, Browne and Cudeck (1993) proposed interpreting values below .05 as a close fit, values between .05 and .08 as a reasonable fit, and values greater than .10 as a poor fit. The analyses of the present study involved invariance tests across time and subgroups of students. Invariance models are nested models in which various model parameters are increasingly set equal across groups. Drawing on the application of the chi-square difference test, invariance would be supported in the case of non-significant

differences in the chi-square values between less restrictive and more restrictive models (i.e., between models with less and models with more model parameters constrained to be invariant). However, as the chi-square difference test has been found to be sensitive to sample size, it easily reaches significance and thus implicates rejection of invariance with large samples (Marsh, Hau, & Grayson, 2005). Therefore, Cheung and Rensvold (2002) recommended using descriptive goodness-of-fit indices for evaluating invariance. According to their guidelines, invariance is supported when the CFI does not drop by more than .01 between nested models (also see Chen, 2007).

5. Results

5.1 Preliminary Analyses

First, we examined the fit of a CFA model in which the three self-concept items used at each measurement point were assumed to form separate factors for students' academic self-concept at the two measurement points. The fit of this model was good, supporting the integrity and validity of the scales used (see Model 1 in Table 1): χ^2 (5) = 1.278; CFI = 1.000; TLI = 1.002; RMSEA = .000. As the standardized factor loadings ranged between .527 and .712 for the items applied at the first measurement point and between .530 and .733 for the items applied at the second measurement point, the factors for depicting students' academic self-concept were well defined at each measurement point. When stating invariant factor loadings (Model 2), or invariant factor loadings and item intercepts across time (Model 3), the declines in the goodness-of-fit indices were above the cut-off criteria introduced by Cheung and Rensvold (2002). Thus, the items used seemed to measure the same construct of academic self-concept across the two measurement points, allowing meaningful longitudinal analyses.

We also examined the mean levels of students' reading comprehension achievement contingent upon school type. Secondary school students demonstrated significantly higher levels of reading comprehension achievement than elementary school students at both measurement points: t1: secondary school students: M = 113.84, SD = 11.27; elementary

school students: $M = 97.33$, $SD = 15.12$; t (4515.381) = -43.434, $p < .00$; Cohen's $d = 1.19$; t2: secondary school students: $M = 119.43$, $SD = 9.08$; elementary school students: $M = 104.64$, $SD = 12.87$; t (4648.781) = -42.651, $p < .001$; Cohen's $d = 1.27$ (also see Table 2). This result exemplified the selectivity of the students eligible for an early transition in terms of academic achievement.

5.2 Contrast Effects and Assimilation Effects

For the first measurement point, Model 4 demonstrated a positive effect of individual reading comprehension achievement on academic self-concept ($\beta = .209$, $p < .001$), that is, higher achieving students displayed more positive academic self-concepts. Class-average reading achievement was found to negatively influence individual students' academic self-concept ($\beta = -.139$, $p < .01$), implying that students had more negative academic self-concepts in classes with high average levels of reading comprehension achievement. This pattern of results supported a contrast effect. School type was found to yield a positive impact upon students' academic self-concept as students attending high-ability secondary schools after early transition displayed higher levels of academic self-concept ($\beta = .197$, $p < .001$). Thus, the results additionally demonstrated an assimilation effect which was greater in size than the contrast effect.

With regard to the second measurement point (Model 5), the results also showed a contrast effect. Individual achievement on the reading comprehension test was positively related to academic self-concept ($\beta = .027$, $p < .001$) while the effect of class-average achievement was negative ($\beta = -.280$, $p < .001$). Model 5 further demonstrated a significant effect of school type on students' academic self-concept indicating a positive influence of attending secondary school after early transition ($\beta = .184$, $p < .001$). This time, the assimilation effect was smaller than that of the contrast effect.

5.3 Normative Stability

Model 6 assuming configural invariance across groups indicated similarly sized correlations between the academic self-concept factors measured at t1 and t2 (elementary school students: $r = .591$; secondary school students: $r = .552$). The invariance tests (Models 7 and 8) confirmed the invariance of factor loadings and item intercepts, as the declines in the CFI values did not exceed .01 relative to the less restrictive models. Given the indication of invariant factor variances in Model 9, we stated equal-sized covariances between the academic self-concept factors measured at t1 and t2 for elementary and secondary school students in Model 10 in order to test the invariance of factor correlations (i.e., normative stability). The fit of this model [$\chi^2(21) = 68.987$, CFI = .988, TLI = .983, RMSEA = .032] supported the invariance of the covariance between self-concept factors across both groups, implying that elementary and secondary school students did not differ in the normative stability of academic self-concept.

5.4 Mean Level Stability

The finding of invariant item intercepts (i.e., strong measurement invariance; Model 8) ensured valid mean level comparisons across groups. A Multiple Indicators Multiple Causes (MIMIC) model (Model 11) regressing students' academic self-concepts at t1 and t2 on school type (0 = elementary school; 1 = secondary school) resulted in positive coefficients [t1: .429, $p < .001$; t2: .244, $p < .001$ (standardized values)], implying that secondary school students displayed higher levels of academic self-concept at t1 and t2.

A latent change model (Model 12) applied to the total sample demonstrated a decrease in the mean level of self-concept given the negative mean of the latent difference variable (standardized value: -.180, $p < .001$). The finding of a decline in students' academic self-concept across time is also supported by the descriptive results showing lower mean levels of academic self-concept at t2 than at t1 for the total sample (Table 2).

To investigate possible differences in the decline of academic self-concept between elementary and secondary school students (i.e., differential mean level stability), school type

(0 = elementary school, 1 = secondary school) was modeled as a predictor of the baseline and difference scores in the latent change model (Model 13). School type was found to yield a significant positive influence on the baseline level of students' academic self-concept at t1 (standardized value: .479, $p < .001$) but was found to be negatively associated with the difference score (standardized value: -.258, $p < .001$). These results indicated that the secondary school students displayed a higher baseline mean level of academic self-concept but showed a more substantial drop in academic self-concept across both measurement points. The descriptive findings corroborated these results (Table 2).

6. Discussion

In the context of the numerous studies on context and assimilation effects on students' academic self-concept, findings have remained unclear regarding the existence and relative strength of assimilation effects. So far, research indicates that strong assimilation effects can be expected when students' group membership is highly salient (Chmielewski et al., 2013; Liu et al., 2005; Trautwein, Lüdtke, Marsh et al., 2006). In previous studies, strong assimilation effects could be demonstrated when students were ability-grouped within one school or school type [e.g., classes for gifted students within the same school (Preckel & Brüll, 2010); different tracks within secondary schools in Singapore (Liu et al., 2005); course-by-course tracking in the same school (Chmielewski et al., 2013)]. Focusing on the exceptional education system in Berlin, the aim of the present study was to shed light on the possible occurrence of strong assimilation effects with respect to different school types.

The results of this study demonstrated the simultaneous occurrence of contrast and assimilation effects at each of the two measurement points. High average class achievement in reading comprehension had a negative effect on students' academic self-concept, demonstrating the contrast effect. However, belonging to the minority of students attending a high-ability secondary school after an early transition had a positive impact on students' academic self-concept, demonstrating an assimilation effect. The assimilation effect was

stronger than the contrast effect at the first measurement point, but weaker, yet still existing, at the second measurement point. These findings match and extend previous conjectures on the operation and relative strength of contrast and assimilation effects. The first measurement point took place at the end of grade 4 for the elementary school students and at the beginning of grade 5 for the secondary school students. At this time, the students might have been highly aware of their performance in the selection process preceding early transition, leading to a strong assimilation effect. At the second measurement point at the end of grade 5, the segregation process might have taken a backseat in students' minds. At this point, students of both groups had already attended different schools for a whole school year, so they had fewer or even no opportunity to interact. During this year, the students without an early transition were not consistently confronted with a more able and more prestigious group of students and might have accepted their school path as the "normal" and "regular" school career followed by the majority of students in Berlin. Consequently, the assimilation effect might have diminished and students' focus might have been redirected to their class as the reference group for social comparison processes, strengthening contrast effects. Thus, findings from the present study support the notion that the relative strength of contrast and assimilation effects might vary depending on the salience of students' segregation into higher and lower prestige groups (Chmielewski et al., 2013; Liu et al., 2005; Trautwein, Lüdtke, Marsh et al., 2006), which also applies to students attending different schools or school types.

Students with and without the experience of an early transition were not found to differ with respect to the normative stability of academic self-concept. Thus, within both the groups of elementary and secondary school students, the students mainly retained their rank orders in the distribution of self-concept levels. Regarding mean level differences, the secondary school students displayed higher mean levels of academic self-concept at both measurement points, which might be expected in light of their higher achievement levels. The mean level of academic self-concept was found to decline in grade 5 for both elementary and

secondary school students. This result fits the numerous findings showing decreasing mean levels of academic self-concept across age (Fredricks & Eccles, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Marsh, 1989; Watt, 2004). However, the students experiencing an early transition revealed a more substantial drop in the mean level of self-concept in grade 5 than the elementary school students, although they still demonstrated relatively higher mean levels at the end of grade 5. This result matches the findings of Liu et al. (2005) and might be explained by substantial changes in students' frames of reference for self-concept formation and higher evaluation standards in the high-ability secondary schools attended after early transition.

6.1 Limitations and Further Directions

Even though our study has elicited some important findings, it faces some theoretical and methodological shortcomings. Students' academic self-concept was measured in a general, domain-unspecific way thus neglecting evidence of the domain specificity of academic self-concept with its differentiation in math and verbal domains (Möller et al., 2009). As achievement was measured by a reading comprehension test, ideally reading self-concept would have been assessed for testing contrast effects since the strongest relations between self-concept and achievement were found in matching domains (Marsh & Craven, 2006; Swann, Chang-Schneider, & Larsen McClarty, 2007). As the achievement measure was limited to a reading comprehension test, further studies are needed to test the generalizability of the reported findings across different achievement indicators. However, reading comprehension achievement seems to be a reasonable indicator of student achievement given its relevance for school achievement in general (Meneghetti et al., 2006; Savolainen et al., 2008). Thus, the self-concept and achievement measures applied in this study both exhibit a domain-spanning nature. Integrating academic self-concept as the only outcome variable might be too restrictive, as the early transition could also affect other outcome variables. However, previous research demonstrating contrast effects for other educational outcomes

such as academic aspirations showed that these effects were mediated mostly by academic self-concept so that academic self-concept is the important variable in research on contrast and assimilation effects (Marsh, 1991; Nagengast & Marsh, 2012).

The study design was not optimal as it did not realize simultaneous data collection at the first measurement point, which took place at the end of grade 4 for elementary school students, but at the beginning of grade 5 for secondary school students. It would be worthwhile to examine a longer period of time and study the long-term development of academic self-concept of students with and without the experience of an early transition. To test the assimilation effect, direct measures of the reputation of the school type (e.g., Marsh et al., 2000) would be desirable in order to assess the value students attribute to an early transition. Finally, as the sample in this study comprised a limited population of students in Berlin, further studies should probe the generalizability of the findings to students from other education systems and countries. Nonetheless, focusing on this particular group of students allowed us to detect the operation of strong assimilation effects even when the students considered attend different types of school.

6.2 Practical Implications

In the education system in Berlin, parents as well as the students may strive for the opportunity to transition early to secondary school. This is understandable as the schools attended after early transition are of high average ability and offer specific programs to promote students' abilities in specific content domains (e.g., music or physical education). Parents and practitioners may believe that the early transition boosts students' academic self-concept, as the eligible students have undergone a competitive selection process. Our study shows that this expected positive effect on students' academic self-concept indeed exists, but it is only temporary and fades in the long run. Once students have become used to the new learning environment and have adjusted to the respective frame of reference, the positive effect of attending high-ability secondary schools after an early transition is overshadowed by

a negative contrast effect. In addition, secondary school students were found to suffer from a more substantial decline in academic self-concept than their peers who remained at elementary school. Given the substantial relations of academic self-concept to other important educational outcomes (e.g., achievement, motivation, aspirations, coursework selection; e.g., Marsh & Craven, 2006), parents and practitioners should be aware of the possible negative effects associated with an early transition. Despite these unfavorable consequences of an early transition, it is noteworthy that even though the assimilation effect was found to decrease over time, it still existed at the end of grade 5, partly compensating the contrast effect and indicating at least some positive consequences of the early transition. Further, assimilation effects might be particularly strong and lasting with regard to other self-concept domains, presumably self-concept domains that reflect the high-ability secondary schools' profiles (e.g., students' physical ability self-concept in schools with a special focus on physical education).

Although the focus of this study was the academic self-concept of students in one federal state of Germany (i.e., Berlin), its implications might even reach beyond. Students eligible for an early transition are selected on the basis of their ability; hence, the early transition in the school system in Berlin can be understood as a form of ability tracking. In addition, the early transition to secondary school in Berlin can be conceived as an acceleration practice in terms of a "progress through an educational program at rates faster or at ages younger than conventional" [Pressey (1949), as cited in Southern & Jones, 2004, p. 5]. As practices of ability tracking and acceleration are applied in numerous education systems all over the world, researchers and practitioners might benefit from the information about the effects on students' academic self-concept provided by this study. Furthermore, the present study might stimulate future research on the short-term and long-term effects of ability tracking and acceleration practices on a wide range of students' self-concepts and personal characteristics (Southern & Jones, 2004). In educational practice, efforts should be made to

determine how to prevent students' academic self-concept from suffering from ability tracking and acceleration practices, as was the case with an early transition in this study, so that students benefit as much as possible from such an exceptional school career.

7. References

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Table 1

Goodness-of-fit Indices of the Various Models

Model	χ^2	df	CFI	TLI	RMSEA	Model Description
1	1.278	5	1.000	1.002	.000	Separate factors for academic self-concept at t1 and t2; correlated uniquenesses between the same items
2	3.596	7	1.000	1.002	.000	Invariant factor loadings across time (weak invariance)
3	35.109	9	.994	.990	.025	Invariant factor loadings and item intercepts across time (strong invariance)
4	111.664	5	942	.885	.054	Multilevel model of contrast and assimilation effects on academic self-concept, t1
5	29.276	6	.989	.971	.031	Multilevel model of contrast and assimilation effects on academic self-concept, t2
6	6.826	10	1.000	1.002	.000	School type as a grouping factor: configural invariance
7	13.847	14	1.000	1.000	.000	School type as a grouping factor: invariant factor loadings (weak invariance)
8	32.206	18	.996	.994	.019	School type as a grouping factor: invariant factor loadings and item intercepts (strong invariance)
9	68.987	20	.988	.981	.033	School type as a grouping factor: invariant factor loadings, item intercepts, and factor variances
10	68.987	21	.988	.983	.032	School type as a grouping factor: invariant factor loadings, item intercepts, factor variances, and factor covariances
11	25.754	11	.997	.994	.017	MIMIC model; academic self-concept at t1 and t2 predicted by school type
12	162.897	10	.966	.950	.058	Latent change model for the total sample
13	165.096	12	.970	.948	.053	Latent change model; baseline and difference score predicted by school type

Note. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation.

Table 2

Means (and Standard Deviations in Parentheses) of Academic Self-concept and Reading Comprehension Achievement

	Academic Self-concept		Reading Comprehension Achievement	
	t1	t2	t1	t2
Total sample	2.85 (0.79)	2.75 (0.77)	104.06 (15.81)	110.10 (13.57)
Elementary school students	2.62 (0.80)	2.63 (0.78)	97.89 (15.09)	104.74 (12.80)
Secondary school students	3.19 (0.64)	2.95 (0.70)	114.00 (11.21)	119.54 (8.95)