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Native Language Self-concept and Reading Self-concept: Same or Different?

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Abstract

In assessing verbal academic self-concept with preadolescents, researchers have used scales for students' self-concepts in reading and in their native language interchangeably. Three studies with German students were conducted to test whether reading and German (i.e., native language) self-concepts can be treated as the same or different constructs. Compared to other facets of academic self-concept, reading self-concept was more highly related to reading test scores (Study 1) and German self-concept to German grades (Study 2). In Study 3, reading and general school self-concepts demonstrated similar relations to German grades. These findings supported the specificity matching principle (Swann, Chang-Schneider, & Larsen McClarty, 2007) and caution researchers against applying reading and native language self-concept scales unsystematically to infer verbal self-concept.

Keywords: academic self-concept, verbal self-concept, specificity matching principle, self-concept measurement, preadolescent children

Recent self-concept research has consistently supported the Marsh/Shavelson model of academic self-concept (Marsh, 1990d) that separates math and verbal self-concepts as distinct dimensions. As such, researchers should treat them as separate constructs and should apply separate scales for measuring math and verbal self-concepts. However, in the measurement of verbal self-concept with preadolescent students, an oblique inconsistency is detectable in previous research. Verbal self-concept has been measured as self-concept in students' native language in some studies (e.g., Eccles, Wigfield, Flanagan, Reuman, & Yee, 1989), but as reading self-concept in other studies (e.g., Eccles, Wigfield, Harold, & Blumenfeld, 1993). This inconsistency in the practice of self-concept measurement might have led to the implicit assumption of the interchangeability of reading and native language (e.g., English) self-concept scales for assessing preadolescent students' verbal self-concept. In this case, reading and native language self-concepts are assumed to constitute the same constructs. However, theoretically, reading and native language self-concept scales are presumed to measure distinct constructs as advances in self-concept research has emphasized the domain specificity and the hierarchical nature of academic self-concept (e.g., Valentine, DuBois, & Cooper, 2004; Yeung, Chui, Lau, McInerney, Russell-Bowie, & Suliman, 2000). The present study aims to shed more light on the discrepancy between self-concept assessment (i.e., equating reading and native language self-concepts) and self-concept theory (i.e., distinguishing between reading and native language self-concepts) through a series of three empirical studies with German preadolescent students.

Reading and Native Language Self-concepts

Due to the Marsh/Shavelson model (Marsh, 1990d; Marsh, Byrne, & Shavelson, 1988), academic self-concept consists of separate math and verbal domains. Hence, separate scales are needed for measuring the verbal and math facets of academic self-concept. When measuring verbal self-concept with preadolescent students, some studies assessed students' self-concept related to their native language (i.e., English self-concept for English-speaking

samples) by asking for students' verbal self-perceptions in a general way and not restricted to one specific language skill such as reading or writing. For example, Skaalvik and Valas (1999) measured the self-concept in language arts of Norwegian students attending grades 3 and 6 depicting students' self-perceptions in the Norwegian language (i.e., students' native language). In achievement motivation research, some studies measured competence beliefs (which can be conceptualized as part of self-concept) related to English (e.g., Eccles et al., 1989; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991) with 6th grade US students. However, in other studies, the verbal self-concept of preadolescent students was measured by a reading self-concept scale (Eccles et al., 1993; Eccles & Wigfield, 1995; Wigfield, Eccles, Yoon, Harold, Arbreton, Freedman-Doan, & Blumenfeld, 1997). Hence, both self-concepts related to native language and related to reading have been found to be used as indicators of preadolescent students' verbal self-concept. The coexistence of reading and native language self-concept scales as measures for preadolescents' verbal self-concept is further suggested by the Self Description Questionnaire (SDQ) instruments. The SDQ I (Marsh, 1990b), probably one of the most prominent self-concept instruments for preadolescents, includes a reading self-concept scale for measuring verbal self-concept with students of grades 3 to 6. However, the SDQ instruments for older students – the SDQ II (Marsh, 1990c) for adolescent students and the SDQ III (Marsh & O'Neill, 1984) for older adolescents and young adults – use an English self-concept scale to measure students' self-concept in the verbal domain. This might lead to the belief that a reading self-concept scale measures the same facet of verbal self-concept with preadolescent students as English (i.e., native language) self-concept does with older students. In this case, English and reading self-concept scales could be interchangeably used for measuring verbal self-concept with preadolescents. Recent self-concept research has however not addressed the issue of whether native language and reading self-concept scales measure the same or different constructs with preadolescents. As advances in self-concept research and theory have emphasized the domain-specific and hierarchical nature of academic

self-concept, it is imperative to reassess the prevalent implicit assumption that reading self-concept and native language self-concept are two exchangeable approaches to assessing preadolescents' verbal self-concept.

The Structure of Verbal Self-concept

Twofold Multidimensionality

The essence of the Marsh/Shavelson model of academic self-concept (Marsh, 1990d; Marsh et al., 1988) is that math and verbal self-concepts cannot be pooled together to form a global academic self-concept but constitute distinct dimensions of students' academic self-concept. Hence, the Marsh/Shavelson model emphasizes the strong domain specificity of academic self-concept. Recent advances in self-concept research have extended this domain specificity to the differentiation between cognitive and affective components within specific domains of academic self-concept (Arens, Yeung, Craven, & Hasselhorn, 2011; Marsh, Craven, & Debus, 1999). That is, within the verbal domain of academic self-concept, a competence component depicting students' self-perceived verbal competence can be separated from an affective component that refers to students' motivational-affective responses toward the verbal domain. Given its domain specificity as well as its separation into competence and affect components, academic self-concept seems to encompass a twofold multidimensional structure (Arens et al., 2011). The twofold multidimensional structure of academic self-concept has been empirically demonstrated in studies of both the within-network and the between-network approaches to construct validation (Byrne, 1984). The within-network approach scrutinizes the internal structure of self-concept. Studies of the within-network approach have revealed separate factors for math and verbal self-concepts in numerous exploratory and confirmatory factor analyses (e.g., Marsh, 1986b, 1990b; Marsh, Smith, & Barnes, 1985). In addition, the competence-related and affect-related items for measuring verbal self-concept were found to form separate constructs in confirmatory factor analyses (Arens et al., 2011; Marsh et al., 1999). The between-network approach examines

the relations between self-concept and outcome variables such as academic achievement. Academic achievement and self-concept have been found to share reciprocal relations (Marsh & Craven, 2005, 2006). Further evincing the distinctiveness of math and verbal self-concepts, the mutually reinforcing relations between self-concept and achievement have been found to be domain-specific in nature. In concrete terms, reciprocal relations have been demonstrated between verbal achievement and verbal self-concept as well as between math achievement and math self-concept, but not between verbal achievement and math self-concept and between math achievement and verbal self-concept (Möller, Retelsdorf, Köller, & Marsh, 2011). Supporting the competence-affect separation of academic self-concept, studies of the between-network approach found the competence component to be more highly related to students' achievement than the affect component (Arens et al., 2011). Hence, the twofold multidimensional structure of verbal self-concept (i.e., the domain specificity and the competence-affect separation) has been empirically demonstrated in studies of both within-network and between-network approaches.

The I/E Model

Academic achievement has been found to positively impact academic self-concept of matching domains but to negatively impact self-concept of nonmatching domains. Concretely, high levels of verbal achievement have been found to yield positive influence upon verbal self-concept but to negatively affect math self-concept (Marsh, 1986b, 1990a). This phenomenon has been explained by the internal/external frames of reference (I/E) model (Marsh, 1986b, 1990a; Möller, Pohlmann, Köller, & Marsh, 2009). The I/E model assumes two comparison processes simultaneously operating in the formation of academic self-concept. In a social (external) comparison process, students compare their own perceived accomplishments in one school subject with the accomplishments of their classmates in the same school subject. In addition, students contrast their own perceived accomplishments in the math domain with their own perceived accomplishments in the verbal domain (an internal

comparison process). The offset between the internal and external comparison processes would lead to correlations between math and verbal self-concepts that are lower than the correlations between math and verbal achievement indicating that math and verbal self-concepts are distinct facets of academic self-concept. In addition, the joint operation of the internal and external comparison processes would result in the described relations between self-concept and achievement of matching and nonmatching domains (i.e., positive influence of verbal achievement on verbal self-concept, but negative influence on math self-concept).

Hierarchical Nature of Verbal Self-concept

While much research has focused on the multidimensional structure of academic self-concept in terms of its strong domain specificity, the hierarchical nature of academic self-concept has received less attention. Among the few studies examining the hierarchical structure of academic self-concept, Yeung et al. (2000) found evidence of a hierarchical structure of verbal self-concept by demonstrating a higher order English self-concept that included self-concepts facets related to specific verbal skills such as speaking, reading, and writing (see also Lau, Yeung, Jin, & Low, 1999). Hence, English self-concept seems to be located on a superordinate level of the self-concept hierarchy reflecting more global verbal self-perceptions whereas reading self-concept might pertain to a skill-specific facet located on a subordinate level. Considering this demonstrated hierarchical relation between native language self-concept (i.e., English self-concept) and reading self-concept, native language and reading self-concepts need to be treated as distinct from each other.

Implications for the Measurement of Verbal Self-concept

The recent advances in self-concept research and theory have important implications for the measurement of verbal self-concept. First, given its domain specificity, verbal self-concept should be distinct from global academic self-concept and math self-concept and thus measured by a separate scale. Second, given the competence-affect differentiation of academic self-concept facets, the competence and affect components of verbal self-concept

should be measured separately. Third, given its hierarchical structure, verbal self-concept can be measured at different levels of specificity: at a skill-specific level (reading or writing self-concepts) or at a more global level (native language self-concept). The appropriate selection of the verbal self-concept measure would have important implications for the relations between verbal self-concept and outcome variables. Valentine et al. (2004) found self-concept and outcome variables to be most highly related if both constructs tap the same content domain and are located at the same level of hierarchy. Swann, Chang-Schneider, and Larsen McClarty (2007) called this the *specificity matching principle* which emphasizes that predictor (e.g., self-concept) and criterion variables (e.g., achievement) are expected to be most highly related if they both pertain to the same content domain and are positioned on the same level of the self-concept hierarchy. In a similar vein, Yeung (2005) recommends that self-concept measures and outcome variables should match in terms of both domain specificity and level of hierarchy. In other words, a mismatch between self-concept and achievement variables will violate the specificity matching principle (Swann et al., 2007) and will result in an unreasonably low and unsystematic correlation between the constructs.

In sum, a mismatch seems to be present between the practice of verbal self-concept measurement and recent findings of self-concept theory. In the practice of self-concept measurement, both reading and native language self-concept scales were used for assessing preadolescent students' verbal self-concept. The implicit assumption of the interchangeability of reading and native language self-concepts in self-concept measurement, however, does not correspond to the recent advances in self-concept theory that have emphasized the domain specificity and hierarchy of verbal self-concept. Self-concept theory would thus predict that reading and native language self-concepts constitute separate constructs. Corresponding to the specificity matching principle, high relations are expected between matching self-concept and achievement measures (Swann et al., 2007). Hence, reading self-concept is expected to be highly related to reading-related outcomes whereas native language self-concept should be

highly related to global verbal outcomes. Such differential relations of reading and native language self-concepts to achievement outcomes would challenge the unsystematic use of reading and native language self-concept scales as indicators of verbal self-concept that could be found in previous studies with preadolescents.

The Present Investigation

The present study serves to resolve the apparent mismatch between self-concept measurement and theory by examining the characteristics of reading and native language self-concepts. It attempts to test whether reading and native language self-concepts constitute the same or different constructs for preadolescent students. For this purpose, we conducted three empirical studies with German preadolescent students. In studies 1 and 3, we assessed students' reading self-concept while students' self-concept in German language (i.e., their native language self-concept) was measured in Study 2. We first examined whether the twofold multidimensional structure of academic self-concept (Arens et al., 2011; Marsh et al., 1999) applied to both reading self-concept and native language self-concept. Hence, we tested whether reading self-concept and native language self-concept are (1) both separable from math self-concept, and (2) both further differentiable into a competence component and an affect component. Second, we examined the relations of reading and German self-concepts to different verbal achievement measures and compared these relations to the relations of other academic self-concept facets (i.e., math and general school self-concepts) to the same verbal achievement measures. We used students' school grades in German and scores in a reading comprehension test as two different verbal achievement outcomes. Grades in German are a more general indicator of verbal achievement reflecting students' accomplishments in a wide range of verbal abilities while a reading comprehension test assesses students' verbal abilities more strictly related to reading. According to the specificity matching principle (Swann et al., 2007), higher relations should result when self-concept and achievement measures are appropriately matched. Hence, relative to the relations of other academic self-concept facets

(i.e., math and general school self-concepts), reading self-concept was expected to demonstrate the highest relations to reading achievement and German self-concept was assumed to have superior relations to German grades. In contrast, linking reading self-concept to a global verbal outcome such as German grades might result in an inappropriate match between self-concept and achievement measures weakening the relation between them. We finally tested whether the I/E model predictions (Marsh, 1986b, 1990a) would apply to both reading and German self-concepts.

Study 1

By measuring students' reading self-concept as an indicator of verbal self-concept, we first examined whether the twofold multidimensional structure can be established for reading self-concept. Using the between-network approach, we further tested and compared the relations between different facets of academic self-concept (i.e., reading, math, and general school self-concepts) and reading comprehension test scores.

Method

Sample. Students attending the 5th grade of the high ability track of German secondary schools participated in Study 1 (N = 163). They were from one coeducational and one girls-only school. As such, there were more girls (N = 116, 71.2 %) than boys (N = 47, 28.8 %). The mean age of the students was 10.18 years (SD = 0.50). All participating students had parental consent for their participation and were advised of the anonymous and confidential treatment of their data.

Reading self-concept. The reading self-concept scale of the original English SDQ I instrument (Marsh, 1990b) was translated into German. German translations of the two other academic self-concept scales integrated in the original SDQ I instrument – math self-concept and general school self-concept (i.e., students' self-perceptions with respect to all school subjects) – were also used in the study in order to test the domain specificity of reading self-concept and to examine the relations of different academic self-concept facets to verbal

achievement. Each academic self-concept scale consisted of eight positively worded and two negatively worded items (10 items in total). On a 5-point, Likert scale, the students were asked to indicate whether the statement for each item was true, mostly true, sometimes true/sometimes false, mostly false, or false. Within each scale, a set of five items (four positive, one negative) asked about students' self-perceptions of competence (e.g., I am good at reading / math / all school subjects) and another set of five items (four positive, one negative) asked about students' affective-motivational responses (e.g., I like reading / math / all school subjects). As a negative item bias has been demonstrated in prior SDQ I research, researchers have been advised to exclude negative items from the analysis (Marsh, 1986a, 1990b). Accordingly, all analyses of this study with German versions of the academic SDQ I self-concept scales were computed without the negative items.

Reading comprehension. A German reading comprehension test, the Frankfurter Leseverständnistest 5-6 (FLVT 5-6; Souvignier, Trenk-Hinterberger, Adam-Schwebe, & Gold, 2008), was administered prior to the students' completion of the self-concept measures. The FLVT 5-6 is a standardized achievement test for measuring students' reading comprehension skills in grades 5 and 6. The test consists of one fictional and one non-fictional text. Students are asked to read each text on their own and answer 18 questions for each text. In a multiple choice format, each question comprises four possible answers from which students have to choose the right answer. The correct answers to both texts are summed to yield a total reading comprehension score.

Statistical analyses. First, coefficient alpha reliability estimates were conducted for each academic self-concept scale used here. Scale reliability was examined for (a) the reading, math, and general school self-concept scales (eight items each), and (b) the subscales of the competence and affect components of the domain-specific self-concept facets (e.g., four items for math competence, four items for math affect).

We then scrutinized the internal structure of the academic self-concept construct measured by the SDQ I scales by running several confirmatory factor analyses (CFA) models. In a 1-factor model (Figure 1a), all items of the three academic self-concept scales (reading, math, general school) were restricted to load on one factor that depicted a global academic self-concept. As such, no domain specificity of academic self-concept was assumed in the 1-factor model. A 3-factor model depicted a domain-specific structure of academic self-concept as separate factors were stated for reading, math, and general school self-concepts that were each defined by the eight positive items of the respective SDQ I scales (Figure 1b). In a 6-factor model (Figure 1c), the domain-specific structure of academic self-concept was extended to the separation between competence and affect components thus depicting the twofold multidimensionality of academic self-concept (Arens et al., 2011; Marsh et al., 1999). That is, separate competence and affect factors were posited for reading, math, and general school self-concepts. Each factor was defined by the four competence-related or by the four affect-related items of each domain-specific self-concept scale. The items of the scales were parallel worded across domains (e.g., I enjoy doing work in reading / math / all school subjects). To account for the shared variance due to the common measurement method (similar wording here), correlated uniquenesses between parallel worded items were assumed in each model.

Next, we examined the correlations between the various academic self-concept facets measured in this study (reading, math, and general school) and reading comprehension. The single item factor of reading comprehension was defined by the reading comprehension test score. The measurement error of the reading comprehension test scores was fixed to a predetermined value based upon the sample variance of the reading comprehension scores and the reliability estimate of the FLVT 5-6. Corresponding to the specificity matching principle (Swann et al., 2007), reading comprehension test scores were expected to be more highly correlated with reading self-concept than with math and general school self-concepts. Hence,

we tested whether the academic self-concept facets measured in our study revealed differential relations to reading comprehension. For this purpose, several restricted CFA models with correlations between self-concept facets and achievement (i.e., reading comprehension) set to be equal were compared to an unrestricted CFA model with freely estimated correlations between self-concept facets and achievement by using the chi-square difference test.

All latent models were computed with the statistical package of Mplus, Version 6.0 (Muthén & Muthén, 1998-2011) using the maximum likelihood (ML) estimator. For evaluating the goodness of fit of the models, several commonly used goodness-of-fit indices are reported (Brown, 2006; Kline, 2005). We present the comparative fit index (CFI) and the Tucker-Lewis index (TLI), for which values above .90 are indicative of a good fit (Hu & Bentler, 1998), the root mean square error of approximation (RMSEA), for which values less than .05 reflect a close fit and values between .05 and .08 reflect a reasonable fit (Browne & Cudeck, 1993), and the standardized root mean square residual (SRMR), for which values less than .08 indicate good model fit (Hu & Bentler, 1998). The chi-square statistic with its degrees of freedom is also reported as a standard and is used for comparing the fit of nested models. Missing values were estimated with the full maximum likelihood method (FIML) implemented in Mplus. The amount of missing data was negligible (0.26 %).

Results

Reliability estimates. The coefficient alpha reliability estimates were good when integrating the competence-related and affect-related items to unified scales for reading (α = .910), math (α = .942), and general school (α = .872) self-concepts. The estimates were also good when treating the competence-related and affect-related items as subscales: reading competence: α = .866; reading affect: α = .887; math competence: α = .907; math affect: α = .943; general school competence: α = .779; general school affect: α = .862. The internal consistency of the reading comprehension test FLVT 5-6 was calculated on the basis of the

Kuder-Richardson Formula 20 (KR-20) that is analogous to alpha reliability estimates for dichotomous items. The KR-20 reliability estimate for the sample of the present study was $\alpha = .793$.

Internal structure. The 6-factor model demonstrated a superior fit compared to the 1-factor model ($\chi^2_{diff}(15) = 1205.524$, $p < .001$) and the 3-factor model ($\chi^2_{diff}(12) = 276.183$, $p < .001$; Table 1). The factors of the 6-factor model were well defined as the standardized factor loadings of the items on their corresponding factors ranged from .581 to .915. Considering the factor correlations (Table 2), the relations between the competence components and affect components of math and reading self-concepts were small in size (competence: $r = .191$; affect: $r = .233$). These results supported the domain specificity of academic self-concept and the competence-affect separation within each academic self-concept domain.

Self-concept-achievement relations. Students' reading comprehension scores as the verbal achievement measure considered here were integrated in the 6-factor model (Model 1; Table 1). The goodness-of-fit indices attested a good fit to this model: $\chi^2(231) = 365.220$, CFI = .953, TLI = .939, RMSEA = .060, SRMR = .051. Amongst all the academic self-concept factors, only the competence and affect components of reading self-concept showed significant relations to reading achievement (competence: $r = .278$, $p < .01$; affect: $r = .262$, $p < .01$; Table 3). A series of restricted CFA models was run to test whether the correlations between the academic self-concept measures and reading comprehension significantly differed from each other. Among the competence components of the various academic self-concepts (reading, math, and general school self-concepts), the competence component of reading self-concept was found to be more highly related to reading comprehension than the competence components of general school and math self-concepts. A CFA model with the correlation between reading competence and reading achievement set to be equal to the correlation between general school competence and reading achievement was tested. This

restricted model was found to be inferior in model fit compared to Model 1 in that the correlations between self-concept facets and reading achievement were freely estimated: χ^2 (232) = 369.887, CFI = .952, TLI = .938, RMSEA = .060, SRMR = .054; $\chi^2_{diff}(1) = 4.667$, $p <$ .05. In parallel, a CFA model that constrained the correlation between reading competence and reading achievement and the correlation between math competence and reading achievement to be of equal size was also found to be significantly worse in model fit compared to Model 1: $\chi^2(232) = 369.063$, CFI = .952, TLI = .938, RMSEA = .060, SRMR = .054; $\chi^2_{diff}(1) = 3.843$, $p < .05$.

Among the affect components of the academic self-concept facets measured in our study, reading affect was demonstrated to yield the highest relation to reading achievement. When restricting the correlation between reading affect and reading achievement to be the same as the correlation between general school affect and reading achievement, the model fit decreased significantly compared to the unconstrained Model 1: $\chi^2(232) = 376.867$, CFI = .950, TLI = .935, RMSEA = .062, SRMR = .057; $\chi^2_{diff}(1) = 11.647$, $p < .001$. A model in which the correlations between reading affect and reading achievement and between math affect and reading achievement were stated to be equal was also found to be of inferior model fit compared to Model 1: $\chi^2(232) = 374.415$, CFI = .950, TLI = .936, RMSEA = .061, SRMR = .057; $\chi^2_{diff}(1) = 9.195$, $p < .01$. An additional model that simultaneously assumed equal-sized relations of the affect components of all academic self-concept factors (i.e., reading, math, and general school self-concepts) to reading achievement also showed a significant decrease in model fit: $\chi^2(233) = 377.456$, CFI = .950, TLI = .935, RMSEA = .062, SRMR = .059; $\chi^2_{diff}(2) = 12.236$, $p < .01$. These results imply that the competence and affect components of reading self-concept were more highly related to reading achievement than all other academic self-concept factors considered here.

Discussion

Reading self-concept was found to be clearly separable from math and general school self-concepts and to be further separable into competence and affect components. This result supported the assumption of a twofold multidimensional structure (Arens et al., 2011) of reading self-concept. Amongst all factors of academic self-concept, reading self-concept (with both its competence and affect components) displayed the relative highest relations to reading comprehension test scores. As reading self-concept and reading achievement were appropriately matched regarding the content and the level of hierarchy, this finding corresponded to the specificity matching principle (Swann et al., 2007).

Study 2

Study 2 aimed to examine the characteristics of native language (i.e., German) self-concept as another often applied measure of preadolescent students' verbal self-concept. In particular, we tested whether the twofold multidimensional structure of academic self-concept was applicable to German self-concept. Furthermore, we examined the relations between German self-concept and school grades in German and compared these relations to those of math and general school self-concepts. We then tested whether the I/E model assumptions would be supported when verbal self-concept was operationalized as German self-concept.

Method

Sample. Participants were 436 German students (188 boys (43.1 %), 248 girls (56.9 %)) attending grade 5 (N = 240) and grade 6 (N = 196) of the high ability track of secondary school. Students' mean age was 11.02 (SD = 0.76) as it is common for German students attending grades 5 and 6.

German self-concept. Instead of the reading self-concept scale used in Study 1, a German language self-concept scale was used in Study 2. The items of the SDQ I reading self-concept scale used in Study 1 were adapted so that they referred to students' self-perceptions in German language. Like the reading self-concept scale, the scale for German self-concept used here also consisted of five (one negative, four positive) competence-related

and five (one negative, four positive) affect-related items. Due to the negative items bias (Marsh, 1986a, 1990b) only the positive items were further analyzed. The other academic self-concept scales (i.e., math and general school self-concept scales) used in Study 1 were retained in Study 2.

Grades in German. The teachers were asked to provide students' school grades in German from the latest school report. For testing the I/E model assumptions, we also collected students' grades in math. School grades in the German educational system are coded from 1 (excellent) to 6 (insufficient). The grades were reverse coded in our analyses so that higher numerical values reflected higher levels of academic achievement.

Statistical analyses. The statistical analyses were similar to those of Study 1. First, we examined the internal structure of self-concept in German language. Second, we examined the correlations between the various academic self-concept facets and grades in German. Third, math achievement was integrated in the analyses in order to test the I/E model assumptions. As students' grades in math and German served as single item variables for the latent constructs of math and verbal achievement, respectively, the measurement errors of grades were calculated on the basis of sample variance and an assumed reliability of $\alpha = .95$. Missing data (0.28 %) were estimated by the FIML method implemented in Mplus.

Results

Reliability estimates. The academic self-concept scales showed good internal consistency when integrating the competence-related and affect-related items to unified scales for German ($\alpha = .935$), math ($\alpha = .945$), and general school ($\alpha = .902$) self-concepts. The coefficient alpha reliability estimates were also good when the competence-related and affect-related items were assumed to form separate subscales for the competence and affect components of academic self-concept domains: German competence: $\alpha = .920$; German affect: $\alpha = .930$; math competence: $\alpha = .920$; math affect: $\alpha = .951$; general school competence: $\alpha = .866$; general school affect: $\alpha = .880$.

Internal structure. For depicting the internal structure of academic self-concept, the 6-factor model showed the best model fit (χ^2 (213) = 590.074, CFI = .961, TLI = .949, RMSEA = .064, SRMR = .041; Table 1) and was superior to the 1-factor model (χ^2_{diff} (15) = 4387.081, $p < .001$) and the 3-factor model (χ^2_{diff} (12) = 1087.006, $p < .001$). As the standardized factor loadings ranged between .706 and .954, the academic self-concept factors were well defined. Between math and German self-concepts, low correlations were found for the competence components ($r = .130$) as well as for the affect components ($r = .091$, Table 2).

Self-concept-achievement relations. German grades as an indicator of verbal achievement were integrated in the 6-factor model (Model 2 in Table 1). All the various goodness-of-fit indices attested a good fit to this model: χ^2 (231) = 634.214, CFI = .959, TLI = .947, RMSEA = .063, SRMR = .042. Restricted CFA models testified that the competence component of German self-concept was more highly related to German grades ($r = .640$) compared to the competence components of general school ($r = .567$) and math self-concepts ($r = .235$; see Table 3). Restricting the correlation between German competence and German grades to be of equal size as the correlation between general school competence and German grades led to a significant decrease in model fit: χ^2(232) = 645.658, CFI = .958, TLI = .946, RMSEA = .064, SRMR = .049; χ^2_{diff} (1) = 11.444, $p < .001$. Similarly, a model that stated equal correlations between German competence and German grades and between math competence and German grades demonstrated a significantly worse fit compared to the fit of Model 2: χ^2(232) = 669.574, CFI = .955, TLI = .942, RMSEA = .066, SRMR = .071; χ^2_{diff} (1) = 35.360, $p < .001$. Furthermore, a model with all competence components (i.e., German, math, and general school competence factors) restricted to correlate equally to German grades was also inferior in model fit compared to Model 2: χ^2 (233) = 670.360, CFI = .956, TLI = .943, RMSEA = .066, SRMR = .071; χ^2_{diff} (2) = 36.146, $p < .001$. Hence, amongst all the competence components of academic self-concept considered (i.e., German, math, and

general school self-concepts), German competence was found to show the highest relation to German grades.

A similar pattern of results was found for the affect components of the academic self-concepts. Table 3 shows that German affect was more highly related to German grades (r = .328) compared to general school affect (r = .250) and math affect (r = .039). Constraining the correlation between German affect and German grades to be equal to either the correlation between general school affect and German grades ($\chi^2(232) = 644.161$, CFI = .958, TLI = .946, RMSEA = .064, SRMR = .048; $\chi^2_{diff}(1) = 9.947$, $p < .01$) or to the correlation between math affect and German grades ($\chi^2(232) = 646.687$, CFI = .958, TLI = .945, RMSEA = .064, SRMR = .054; $\chi^2_{diff}(1) = 12.473$, $p < .01$) led to significant decreases in model fit compared to Model 2. A further model assuming equal-sized correlations between all affect components of academic self-concept (i.e., German, math, and general school affect factors) and German grades was also found to be inferior in model fit compared to the unrestricted Model 2: $\chi^2(233) = 647.521$, CFI = .958, TLI = .946, RMSEA = .064, SRMR = .054, $\chi^2_{diff}(2) = 13.307$, $p < .01$. In sum, the correlation between German affect and German grades was the highest amongst all the correlations between affect components of academic self-concept facets and German grades considered here.

The I/E model. For testing the I/E model assumptions, both math and German grades were integrated in a CFA model. In a latent regression analysis with that model, math grades were found to have a positive impact upon math self-concept (competence: $\beta = .717$, $p < .001$; affect: $\beta = .440$, $p < .001$) but not upon German self-concept (competence: $\beta = -.075$, nonsignificant; affect: $\beta = -.233$, $p < .001$). German grades demonstrated positive impact upon German self-concept components (competence: $\beta = .689$, $p < .001$; affect: $\beta = .459$, $p < .001$) but negative impact upon math self-concepts (competence: $\beta = -.142$, $p < .01$; affect: $\beta = -.194$; $p < .01$). Hence, the I/E model assumptions were strongly supported for both the competence and affect components of math and German self-concepts.

Discussion

Study 2 demonstrated a twofold multidimensional structure of native language self-concept in German as it was found to be clearly separable from math and general school self-concepts and to be further separable into competence and affect components. Among the competence components of German, math, and general school self-concepts, German competence was found to have the highest relations to grades in German. Similarly, the affect component of German self-concept was found to have higher relations to grades in German than the affect components of math and general school self-concepts. This finding corresponds to the specificity matching principle (Swann et al., 2007) since students' self-concept in German and German grades are appropriately matched given their skill-spanning, general nature.

The overarching aim of the present study was to test whether reading and native language self-concepts display similar constructs that can be equally used to infer preadolescent students' verbal self-concept. Studies 1 and 2 so far have demonstrated some similarities between reading and native language self-concepts. Both demonstrated a twofold multidimensional structure and both were found to share high relations with appropriately matched outcome variables (reading comprehension test scores for reading self-concept, German grades for German self-concept). However, only relying on the findings of Studies 1 and 2, it would be premature to treat reading and native language self-concepts (i.e., German self-concept) as equivalent. In order to justifiably apply reading and native language self-concepts interchangeably, both should yield similar relations to the same verbal achievement outcome. In concrete terms, for reading self-concept to be interchangeable with German self-concept, reading self-concept should show higher relations to German grades than math and general school self-concepts as it was demonstrated for German self-concept in Study 2. This was tested in Study 3.

Study 3

As in Study 1, reading self-concept was measured in Study 3. For assessing students' verbal achievement, students' grades in German as a school subject were used as in Study 2. Study 3 also served to examine whether the I/E model assumptions would be supported for reading self-concept.

Method

Sample. In order to ensure that the samples were comparable across the three studies with respect to students' cognitive abilities and social background, the sample of Study 3 consisted of 222 German students (83 (37.4 %) boys, 139 girls (62.6 %) attending grades 5 and 6 of the high ability track of German secondary school (age $M = 11.18$, $SD = 0.68$).

Reading self-concept. The same scales for measuring academic self-concept were used as in Study 1 (i.e., reading, math, and general school self-concept scales).

Grades in German. Similar to Study 2, students' grades in German from the latest school report were used as an indicator of verbal achievement. For testing the I/E model assumptions, we also collected teacher reports of students' grades in math.

Statistical analyses. The statistical analyses were similar to those of Studies 1 and 2. Presumed reliability estimates of $\alpha = .95$ were used for German and math grades as single item indicators for math and verbal achievement. Missing values (0.43 %) were estimated with the FIML method implemented in Mplus.

Results

Reliability estimates. The reliability estimates were good for the unified scales of reading ($\alpha = .922$), math ($\alpha = .948$), general school ($\alpha = .882$) self-concepts. The internal consistencies were also good when treating the competence-related and affect-related items as subscales for each domain: reading competence: $\alpha = .843$, reading affect: $\alpha = .919$, math competence: $\alpha = .926$, math affect: $\alpha = .946$, general school competence: $\alpha = .851$, and general school affect: $\alpha = .853$.

Internal structure. Table 1 presents the goodness-of-fit indices for the tested models. The 6-factor model provided the best fit to the data: χ^2 (213) = 345.916, CFI = .968, TLI = .958, RMSEA = .053, SRMR = .042, which was statistically superior compared to the 1-factor model (χ^2_{diff}(15) = 2032.697, $p < .001$) and the 3-factor model (χ^2_{diff}(12) = 480.160, $p < .001$). The factors of the 6-factor model were well defined as the standardized factor loadings ranged from .537 to .953. Considering the standardized factor correlations (Table 2), small correlations were found between the competence components of reading and math self-concepts (r = .197) and between the affect components of reading and math self-concepts (r = .139). These results supported the domain specificity of the reading and math self-concepts as well as the separation of competence and affect components within each domain.

Self-concept-achievement relations. Based on the 6-factor model, students' verbal achievement defined by students' school grades in German was used to test between-network relations (Model 3 in Table 1). The goodness-of-fit indices of this model were good: χ^2 (231) = 370.706, CFI = .967, TLI = .957, RMSEA = .052, SRMR = .042.

Table 3 shows the latent correlations between the academic self-concept factors and verbal achievement. The competence component of general school self-concept showed a higher relation to German grades (r = .474) than the competence component of reading (r = .218) and math (r = .187) self-concepts. A restricted model that assumed equal-sized correlations between the competence component of general school self-concept and German grades and between the competence component of reading self-concept and German grades was tested. Compared to Model 3 without any model constraints, this restricted model was found to be inferior in model fit: χ^2 (232) = 383.165, CFI = .964, TLI = .953, RMSEA = .054, SRMR = .054; χ^2_{diff}(1) = 12.459, $p < .001$. Hence, general school competence self-concept was found to be more highly related to German grades than the competence component of reading self-concept. The competence components of reading self-concept and math self-concept were found to yield similar relations to German grades as a model with the respective

correlations set to be equal did not lead to a decreased model fit compared to Model 3: χ^2 (1) = 370.718, CFI = .967, TLI = .957, RMSEA = .052, SRMR = .042; χ^2_{diff} (1) = 0.012, nonsignificant. Furthermore, a model that constrained the competence components of all self-concept factors (i.e., reading, math, and general school self-concepts) to be equally related to German grades displayed a significant drop in model fit compared to Model 3: χ^2 (233) = 393.148, CFI = .962, TLI = .951, RMSEA = .056, SRMR = .053; χ^2_{diff} (2) = 22.442, $p < .001$. This finding implies that amongst all the competence components of the academic self-concept facets considered (i.e., reading, math, general school), the competence component of general school self-concept was found to show the highest correlation to German grades.

The affect components of general school self-concept and reading self-concept were found to be similarly correlated to German grades (general school affect: $r = .258$, reading affect: $r = .244$). There was no decrease in model fit when positing equal-sized correlations between general school affect and German grades and between reading affect and German grades: χ^2 (232) = 370.771, CFI = .967, TLI = .957, RMSEA = .052, SRMR = .042; χ^2_{diff} (1) = 0.065, nonsignificant. Reading affect and math affect were also found to be equally related to German grades since there was no decrease in model fit when restricting the respective correlations to be of equal size: χ^2 (232) = 373.981, CFI = .966, TLI = .956, RMSEA = .053, SRMR = .046; χ^2_{diff} (1) = 3.275, nonsignificant. All affect components of academic self-concepts (i.e., reading, math, general school) seemed to be similarly related to German grades since there was no decline in model fit when stating equal-sized correlations between all affect components and German grades (χ^2(233) = 375.340, CFI = .966, TLI = .956, RMSEA = .052, SRMR = .046; χ^2_{diff} (2) = 4.634, nonsignificant).

I/E model. For testing the I/E model assumptions, a latent regression model was examined. Math achievement was found to have significant positive impact upon both components of math self-concept (competence: $\beta = .654$, $p < .001$; affect: $\beta = .361$, $p < .001$), but not upon reading self-concept (competence: $\beta = -.070$; affect: $\beta = -.023$, both

nonsignificant). Verbal achievement (German grades) was found to have a significant positive influence on reading self-concept (for both competence and affect: $\beta = .258$, $p < .01$), but not math self-concept (competence: $\beta = -.134$, affect: $\beta = -.129$, both nonsignificant). Hence, there was strong support for the I/E model (Marsh, 1986b) when reading self-concept was used as an indicator for students' verbal self-concept.

Discussion

Like Study 1, reading self-concept was found to be clearly separable from math and general school self-concepts and to be further differentiable into competence and affect components supporting the twofold multidimensional structure of reading self-concept. Considering the relations between academic self-concept facets and German grades, general school competence was found to be more highly correlated with German grades than was any other academic self-concept factor tested. In essence, reading self-concept (irrespective of competence or affect components) did not show any stronger association with German grades than did general school self-concept. Reading self-concept was similarly related to German grades as math self-concept. The relatively low correlation between reading self-concept and German grades might result from a mismatch between self-concept (i.e., reading self-concept) and achievement measures (i.e., German grades). The I/E model assumptions (Marsh, 1986b) could be demonstrated even in this case of a mismatch between self-concept and achievement measures.

General Discussion

In academic self-concept research, there is a broad compliance regarding the domain specificity of academic self-concept with its differentiation into math and verbal facets (Marsh, 1990b, Marsh et al., 1988). For measuring verbal self-concept with preadolescent students, both scales for reading self-concept and scales related to native language self-concept (e.g., English self-concept for English speakers; German self-concept for German speakers) have been used. This inconsistency in the assessment of preadolescent students'

verbal self-concept could have reinforced the assumption that reading and native language self-concepts constitute similar constructs. The presumed interchangeable use of reading self-concept and self-concept in native language contradicts advances in self-concept theory and research that underline the domain-specific and hierarchical nature of verbal self-concept (Yeung et al., 2000). Hence, the aim of the present series of studies was to test whether scales for reading self-concept and native language self-concept measure the same or different facets of German preadolescent students' verbal self-concept.

Both reading self-concept and German self-concept were found to be separable from math self-concept and to be further distinguishable into competence and affect components. As such, the twofold multidimensional structure of academic self-concept with its domain specificity and separation into competence and affect components (Arens et al., 2011) seems to be generalizable across the different measures of verbal self-concept. Furthermore, the I/E model (Marsh, 1986b, 1990a) was clearly replicated for both German self-concept and reading self-concept. That is, the internal and external comparison processes influencing the formation of self-concept seem to operate similarly for self-concept in German language and for reading self-concept. The consistent replication of self-concept research findings such as the twofold multidimensional internal structure and the I/E model predictions with both the German self-concept and reading self-concept scales is likely to reinforce the impression of the similarity between, or even equivalence of, reading self-concept and native language self-concept. This may abet the practice of using reading and native language self-concepts interchangeably for measuring preadolescent students' verbal self-concept.

However, the correlations found in the present study between academic self-concept facets and verbal achievement measures did not support the assumption that reading and native language self-concept constitute the same constructs. Compared to general school and math self-concepts, reading self-concept was found to be more highly related to reading comprehension scores in Study 1. Native language (i.e., German) self-concept was more

highly related to German grades than all other assessed academic self-concept facets in Study 2. While Study 2 demonstrated that German self-concept was more highly related to German grades than any other academic self-concept facet, Study 3 did not find reading self-concept to display the relative highest relations to German grades. Instead, general school self-concept demonstrated higher relations to German grades than reading and math self-concepts. These findings correspond to the specificity matching principle (Swann et al., 2007) emphasizing that an appropriate match between self-concept and outcome measures with respect to their content domain and specificity level results in relatively higher relations between them. In contrast, an insufficient match between self-concept and achievement measures as in the case of linking reading self-concept and German grades might weaken the relation between the self-concept and achievement measures.

From Study 2 we learn that native language German self-concept displayed higher relations to German grades compared to math and general school self-concepts. Study 3 showed that amongst reading, math, and general school self-concepts, general school self-concept but not reading self-concept had the highest relations to German grades. In addition, in Study 3, the competence component of reading self-concept yielded similar relations to German grades as the competence component of math self-concept even though math and verbal self-concepts are conceptualized as distinct constructs in contemporary self-concept research (Marsh, 1990d). Hence, given the differential relations of reading and native language self-concepts to German grades, reading and native language self-concept scales should not be treated as equivalent to infer preadolescent students' verbal self-concept.
In fact, reading and native language self-concepts scales seem to measure different constructs. Reading self-concept seems to reflect students' self-perceptions in the specific domain of reading as reading self-concept was found to be more highly related to reading comprehension scores compared to the other measured academic self-concept facets (Study 1). Considering that native language (i.e., German) self-concept was more highly related to German grades

than all other assessed academic self-concept facets (Study 2) but did not show the relative highest relations to reading achievement (Study 3), German self-concept seems to reflect students' self-perceptions at a more global level of the verbal domain. Hence, if we wish to explain and predict students' reading achievement, reading self-concept is likely to be the better measure to use. If, however, the target is to explain and predict global measures of verbal achievement such as German grades, German self-concept should be used instead. In other words, as reading self-concept seems to be more narrowly defined and primarily skill-specific, it may not be a good measure for explaining and predicting general verbal outcomes (e.g., German grades). Furthermore, as self-concept in German language seems to be more broadly defined, it may not be a strong measure for explaining and predicting skill-specific reading outcomes. Hence, researchers and practitioners should take caution in matching self-concept and achievement measures when considering the relations between them.

However, these conclusions may be premature as they are only based on studies that consist of samples of 5th grade and 6th grade German students attending the high ability track of secondary school. As such, further research is needed in order to test the generalizability of the present findings to students who attend the lower ability tracks of German secondary schools. It might be also interesting to examine the validity of our findings to younger students. The verbal curriculum of younger students might be even more strongly focused on reading instruction than that of 5th and 6th grade students. This might lead to a different structure of students' verbal self-concept with a more predominant role of reading self-concept. Furthermore, as younger students were found to display a less differentiated self-concept (Marsh, 1989; Marsh & Ayotte, 2003), skill-specific (reading) and global (German) verbal self-concepts may not be clearly distinguished as separate constructs with younger children. Hence, the structure of verbal self-concept of younger students should be scrutinized in future studies. These studies might inform us about developmental processes in the relations between skill-specific and global verbal self-concept facets and about their

appropriate measurement at various developmental stages. Nonetheless, the present study has suggested that reading and German self-concepts of German 5th and 6th grade students may constitute separate constructs as displayed in their differential relations to German grades. The study has thus contributed to the measurement of verbal self-concept with German students as it suggests that it may not be appropriate for reading and German self-concept scales to be used interchangeably as if they were equivalent.

As the three studies presented are cross-sectional, they do not allow any insight into the causal relations between verbal self-concept indicators (i.e., reading self-concept, German self-concept) and verbal achievement measures (i.e., reading achievement, German grades). Contemporary self-concept research has supported a reciprocal effects model (REM; Marsh & Craven, 2005, 2006) in that academic self-concept and academic achievement are said to be reciprocally related to each other. As such, it would be interesting to test whether the REM would apply to different constructs of verbal self-concept and verbal achievement (i.e., reading and German self-concepts and achievement). In addition, further studies are needed in order to examine whether reciprocal effects could also be found across different facets of verbal self-concept, for example, whether reading self-concept is not only reciprocally intertwined with the matching achievement measure of reading achievement but also with nonmatching and more global verbal achievement measures such as school grades in German.

In Study 1, reading self-concept was found to be the only academic self-concept facet that was significantly correlated to reading comprehension scores. This result corresponds well to the predictions of the specificity matching principle (Swann et al., 2007) and supports the conclusion of our study that reading and native language self-concepts might constitute separate constructs. However, the latent correlation between reading self-concept and reading achievement found in Study 1 was quite low compared to the factor correlation that could be found between German language self-concept and German grades in Study 2. The reasons for this result have remained unclear and could involve the construct of reading self-concept itself

or the marginal reliability of the reading comprehension test. However, the conclusion of this study regarding the distinctiveness of reading and native language self-concepts has been derived mainly from the observed differences in the relations of reading self-concept to German grades and reading achievement and is not grounded on the absolute coefficients for the correlations between reading self-concept and outcome measures. Nevertheless, future research should give further insight into the strengths of the relations between different verbal self-concept and achievement measures.

Finally, the conclusions of our study were deduced from comparing the relations of reading and German self-concepts to verbal achievement measures to the relations of math and general school self-concepts to the same verbal achievement measures. In other words, reading or German self-concepts were compared to math and general school self-concepts, but were not contrasted to each other. Hence, future empirical studies should be administered with different measures for verbal self-concept (e.g., reading self-concept, self-concept in native language) and various indicators of verbal achievement (e.g., reading comprehension, school grades) integrated simultaneously in the same study. Led by the within-network approach investigating the structure of verbal self-concept (Byrne, 1984), such a research design would allow testing whether reading self-concept forms a subcomponent of German self-concept as Yeung et al. (2000) illustrated for English self-concept. Hence, such an extended approach would allow testing a presumptive hierarchical structure of verbal self-concept in that the skill-specific reading self-concept might depict a subcomponent of the skill-spanning construct of German self-concept. Studies incorporating both reading and native language self-concepts and respective achievement measures would also extend the findings of Yeung et al. (2000) to the between-network approach. Then the specific relations between various constructs of verbal self-concept (e.g., reading self-concept, self-concept in native language) and different verbal achievement criteria (e.g., reading achievement, German grades) could be tested. In the light of our results and the specificity matching principle (Swann et al., 2007),

reading self-concept would be expected to yield higher relations to reading achievement than to German grades while German self-concept should be more highly related to German grades than to reading achievement. When expanding the investigation of verbal self-concept to the between-network approach, it would also be useful to apply, in addition to academic achievement, other outcome variables such as coursework selection (e.g., Marsh & Yeung, 1997), intrinsic motivation (Skaalvik & Rankin, 1995), or attribution of success and failure (Marsh, 1984) that were found to be related to academic self-concept.

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Table 1

Goodness-of-Fit Indices of Alternative CFA Models of Studies 1 to 3

	χ^2	df	CFI	TLI	RMSEA	SRMR
1-Factor Model: global academic self-concept						
Study 1	1541.889	228	.539	.442	.188	.173
Study 2	4977.155	228	.504	.399	.219	.311
Study 3	2378.613	228	.479	.370	.206	.194
3-Factor Model: domain-specificity of academic self-concept						
Study 1	612.548	225	.864	.833	.103	.069
Study 2	1677.080	225	.848	.814	.122	.079
Study 3	826.076	225	.854	.822	.110	.073
6-Factor Model: domain-specificity and competence-affect separation						
Study 1	336.365	213	.957	.944	.060	.051
Study 2	590.074	213	.961	.949	.064	.041
Study 3	345.916	213	.968	.958	.053	.042
6 Factor Model with verbal achievement						
Study 1 (Model 1)	365.220	231	.953	.939	.060	.051
Study 2 (Model 2)	634.214	231	.959	.947	.063	.042
Study 3 (Model 3)	370.706	231	.967	.957	.052	.042

Note. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation, SRMR = standardized root mean squared residual.

Table 2
Standardized Factor Correlations of the 6-Factor Model for Studies 1 to 3

		Reading / German competence	Reading / German affect	Math competence	Math affect	School competence
Reading / German affect						
	Study 1 - Reading	.731***				
	Study 2 - German	.757***				
	Study 3 - Reading	.798***				
Math competence						
	Study 1	.191*	.156			
	Study 2	.130**	.063			
	Study 3	.197**	.192**			
Math affect						
	Study 1	.087	.233**	.814***		
	Study 2	-.038	.091	.789***		
	Study 3	.090	.139*	.800***		
School competence						
	Study 1	.389***	.329***	.674***	.515***	
	Study 2	.623***	.420***	.603***	.378***	
	Study 3	.302***	.325***	.608***	.379***	
School affect						
	Study 1	.266***	.439***	.542***	.658***	.767***
	Study 2	.398***	.587***	.480***	.574***	.741***
	Study 3	.271***	.419***	.384***	.490***	.719***

Note. School = general school self-concept.
*** $p < .001$. ** $p < .01$. * $p < .05$.

Table 3

Standardized Correlations between Academic Self-concept and Verbal Achievement

	Reading comprehension (Study 1) $N = 163$	German grades (Study 2) $N = 436$	German grades (Study 3) $N = 222$
Reading competence	.278**	-	.218**
Reading affect	.262**	-	.244***
German competence	_	.640***	-
German affect	_	.328***	-
General school competence	.085	.567***	.474***
General school affect	-.066	.250***	.258***
Math competence	.038	.235***	.187**
Math affect	-.088	.039	.047

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

Figure Caption

Figure 1a: One-factor Model of Academic self-concept: Global Academic Self-concept
Note: s.c. = self-concept; school = general school; com = competence

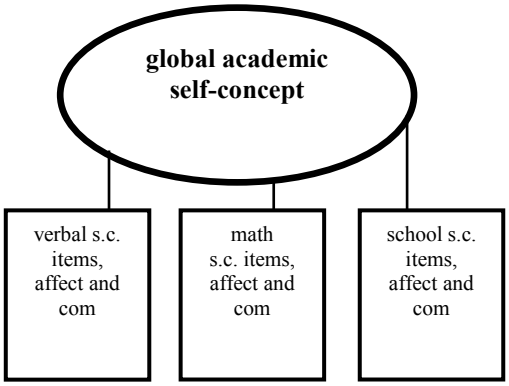

Figure 1b: Three-factor Model of Academic Self-concept: Domain Specificity
Note: s.c. = self-concept; school = general school; com = competence

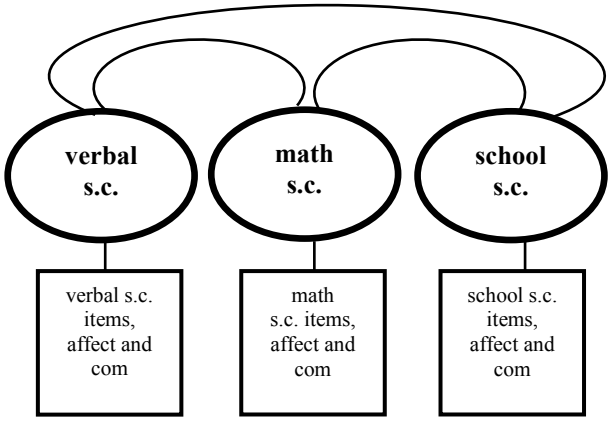

Figure 1c: Six-factor Model of Academic Self-concept: Twofold Multidimensionality
Note: s.c. = self-concept; school = general school; com = competence
All factors are allowed to correlate. For the sake of clarity, only a part of factor correlations are integrated in the figure.