



Mechanisms mediating the relation between reading self-concept and reading comprehension

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Abstract

Reading self-concept is an important predictor of reading comprehension and vice versa. However, the mechanisms that are at work in this relation have yet to be identified. In line with the self-enhancement approach, we propose that in the reading domain, amount of reading, book choice (text difficulty and book length), and intrinsic reading motivation should function as mediating variables in the relation between reading self-concept and reading comprehension. We tested this hypothesis with longitudinal data gathered from $N = 405$ German students in Grades 7, 8, and 9. The results showed that reading self-concept had a positive effect on reading comprehension, intrinsic motivation, book length, and amount of reading. However, indirect paths between reading self-concept and reading comprehension were found only for intrinsic motivation, not for amount of reading or book choice. The results are discussed in the context of students' reading comprehension development, and consequences for research and education are derived.

Keywords Reading self-concept · Self-enhancement approach · Intrinsic motivation · Reading behavior · Reading comprehension development

Introduction

The ability to read and understand words, sentences, and text is one of the basic qualifications required for participation in cultural, political, and economic life (Organization for Economic Co-operation and Development; OECD 2003). Therefore, educators have asked how students'

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reading skills can be enhanced. Reading self-concept has proved to be one important variable explaining interindividual differences in reading achievement (e.g., Artelt et al. 2001; Chapman and Tunmer 1997; Möller and Schiefele 2004). Reading self-concept (a subcategory of academic self-concept) can be understood as people's mental representations of themselves, including cognitive-evaluative aspects and beliefs about their own reading-related skills and reading comprehension in general (Möller and Schiefele 2004; Möller and Trautwein 2009; Shavelson et al. 1976). Despite the fact that reading self-concept has been identified as a significant predictor of the development of reading skills (Valentine et al. 2004, for an overview), it is unclear which factors contribute to and mediate this relation because this question has rarely been considered in reading research (Dickhäuser 2006; Marsh and Yeung 1997). It is often assumed that reading self-concept affects aspects of reading behavior, such as literacy choices, amount and volume of reading, or intrinsic motivation to read, which in turn affects reading achievement, although empirical evidence supporting these assumptions is scarce (Durik et al. 2006; Guay et al. 2010; Möller and Schiefele 2004). To address this research gap, we investigated in the present study whether the relation between reading self-concept and reading achievement is mediated by different facets of students' reading behavior, namely, amount of reading and book choice (text difficulty and book length) as well as reading enjoyment, the central facet of intrinsic reading motivation.

The relation between academic self-concept and achievement

Self-concept research especially builds on work by Shavelson et al. (1976) and Marsh and Shavelson (1985), who characterize self-concept as multidimensional and hierarchically structured. First, self-concept can be differentiated into academic and nonacademic (social, emotional, and physical self-concept) components (Shavelson et al. 1976). Second, academic self-concept is further subdivided into specific domains such as verbal (e.g., German or English), science, or math. Verbal self-concept refers to beliefs and evaluations about one's own written and oral language skills in both one's native and foreign languages, including reading comprehension skills. Therefore, native language reading self-concept can be understood as one specific aspect of a person's verbal self-concept. There is profound evidence that academic self-concept in different domains is positively related to academic achievement (e.g., Huang 2011; Marsh and Yeung 1997; Valentine et al. 2004). The direction of the causal relation between academic self-concept and achievement (whether academic self-concept predicts achievement or vice versa) has frequently been discussed (e.g., Guay et al. 2003; Skaalvik and Valås 1999). In summary, there is evidence that this relation goes in both directions (e.g., Dickhäuser 2006; Kurtz-Costes and Schneider 1994; Marsh and Craven 2006; Marsh et al. 2005; Valentine et al. 2004). When conceptualizing the two opposite mechanisms of action within the so-called reciprocal effects model (Marsh and Yeung 1997), the following two approaches are usually considered.

First, there is the so-called skill-development approach in which academic self-concept is considered to be a consequence of achievement, specifically the sum of one's experiences in this context (Calsyn and Kenny 1977). Individuals' academic self-concept is defined by their perceptions of their skills and performance. Students' achievement—in the sense of test performance or grades—is usually openly communicated to students, making such measures powerful sources from which students can build their self-concept (Abu-Hilal et al. 2013; Helmke and van Aken 1995). Therefore, students' success or failure in performance situations (achievement) can influence their academic self-concept directly, because it affects their

perception of themselves as either competent and skilled in this context or not (Chapman et al. 2000; Chapman and Tunmer 1997; Helmke and van Aken 1995). Therefore, we may infer that achievement has a direct effect on a person's academic self-concept.

The opposite causal direction is most frequently referred to as the "self-enhancement approach." In this approach, achievement is considered to be a consequence of a positive or negative academic self-concept (Calsyn and Kenny 1977). Helmke and van Aken (1995), p. 624 explained this relation by arguing that a high academic self-concept is an important "precondition for the initiation and persistence of effort in learning and achievement situations [...] also, students with a low self-concept might avoid critical learning situations that could threaten their self-concept and thus show less effort in school." In summary, the mechanism behind one causal direction (skill-development approach) has been quite well-examined, with findings showing that achievement seems to affect academic self-concept directly. On the other hand, the effect of academic self-concept on achievement (self-enhancement approach) is in need of further clarification, because the mechanism of action does not seem to be directly explainable or can be explained only through the initiation and persistence of learning behavior (Helmke and van Aken 1995). Therefore, we sought to more closely examine this causal direction.

The self-enhancement approach and mediating factors in the reading domain

We rely on two theories as the basis for our theoretical framework regarding mediating factors within the self-enhancement approach in the reading domain. First, in accordance with the theory of reasoned action (Fishbein and Ajzen 2011), it might be assumed that a person's beliefs about a behavior (e.g., a person's self-concept with respect to reading) cause them to engage in specific behavior, such as reading more or fewer books or putting more or less effort into reading (e.g., reading complex vs. easy texts). This behavior in turn influences people's achievement (e.g., Mol and Bus 2011; Möller and Schiefele 2004). For instance, research from the domain of mathematics has shown that self-concept in mathematics affects students' learning behavior: Students with a lower self-concept were more likely to opt out of an advanced math course in comparison to students with a higher self-concept. This behavior (the selection of a general vs. advanced math course) in turn had an effect on students' mathematics achievement (Köller et al. 2006).

Another potential mechanism based on the self-enhancement approach concerns intrinsic reading motivation. Intrinsic reading motivation can be understood as a construct that includes emotional-affective components experienced while reading (Artelt et al. 2010; Möller and Schiefele 2004). Therefore, intrinsic motivation is characterized by a high level of enjoyment experienced while performing an action (Deci and Ryan 1985, 2000; Möller and Schiefele 2004). In the reading context, this means that intrinsically motivated readers should experience a high level of reading enjoyment. To explain the role of intrinsic reading motivation, we refer to the expectancy-value theory (EVT) of motivation by Wigfield and Eccles (2000), for which beliefs about one's own abilities are central. According to one prominent assumption of EVT, a person is highly intrinsically motivated to perform an action when he or she can expect to successfully complete the task and performing task-inherent activities promises a high level of enjoyment (intrinsic task value). Furthermore, the expectancy of being able to successfully complete a specific task depends on a person's general self-schemata, including their ability self-concept (Wigfield and Eccles 2000). In light of this theoretical background, it can be assumed that a higher reading self-concept leads to an increase in intrinsic reading motivation. A high intrinsic motivation to read might then lead to higher reading achievement (e.g., Guthrie et al. 2007;

McElvany et al. 2008; Morgan and Fuchs 2007). Guay et al. (2010) conducted a study to empirically address this notion, finding that intrinsic motivation with respect to school mediated the relation between academic self-concept and achievement. In contrast, no empirical support for the opposite causal direction (academic self-concept as a mediator of the relation between intrinsic motivation and achievement) was found. However, it is important to consider that the authors examined this relation for school in general, rather than within specific academic domains. Another example, although within the domain of mathematics, is provided by Köller et al. (2006), who found that self-concept predicted students' interest in mathematics (a construct closely related to intrinsic motivation), which in turn predicted students' mathematics achievement. These studies provide first evidence that behavior and intrinsic motivation mediate the relation between self-concept and achievement. However, learning activities are specific to different academic domains. Therefore, a closer look at the reading domain is needed.

Empirical studies on the relation between reading self-concept, intrinsic reading motivation, reading behavior, and reading achievement

As mediating factors or as an explanation for why reading self-concept might predict reading achievement, it is often assumed that reading self-concept affects reading behavior, in the sense of the sum of activities related to reading (e.g., literacy choices, amount and volume of reading) as well as one's intrinsic motivation to read (Durik et al. 2006; Guay et al. 2010; Möller and Schiefele 2004). Despite these theoretical assumptions and the often criticized lack of research on the mechanisms behind the relation between reading self-concept and reading achievement (Dickhäuser 2006; Marsh and Yeung 1997; Retelsdorf et al. 2014), research in this area is still scarce. Nevertheless, we refer to several studies that have at least focused on particular paths of relations between reading self-concept, reading achievement, reading motivation, and reading behavior.

Reading self-concept and intrinsic reading motivation

Few studies have investigated the relation between reading self-concept and intrinsic reading motivation. A longitudinal study by Skaalvik and Valås (1999) found no evidence that verbal self-concept predicts reading motivation or subsequent reading achievement. However, this lack of relation might be explained by the fact that the authors relied on verbal self-concept instead of reading self-concept to predict reading motivation. In other words, a rather general predictor (verbal self-concept) was used to predict a specific construct (reading motivation). The lack of relation between self-concept and motivation might merely reflect the fact that the considered motivation and self-concept variables were not located on the same level of specificity, i.e., not related to the same specific content. Hence, verbal self-concept should more closely relate to verbal motivation, while reading self-concept should more closely relate to reading motivation (specificity matching; Swann et al. 2007). In line with this, Park (2011) could demonstrate that reading self-concept was significantly correlated with intrinsic reading motivation and reading achievement. However, his findings were based solely on cross-sectional data.

Reading self-concept and reading behavior

Both Baker and Wigfield (1999) and Wigfield and Guthrie (1997) uncovered a positive relation between self-beliefs (e.g., academic self-concept or reading efficacy) and amount of

reading. In a more recent study, Durik et al. (2006) examined the longitudinal effects of reading self-concept on leisure time reading. They showed that reading self-concept positively predicted leisure time reading. The authors interpreted their findings as indicating that people with a higher reading self-concept spend more time reading for pleasure because it is easier for them to understand and interpret texts. Similarly, Park's cross-sectional analyses (2011) showed that reading self-concept was significantly correlated with reading volume and reading achievement. However, all of these studies focused on quantitative aspects of reading behavior, neglecting the possibility that reading self-concept might affect not only reading volume but also reading quality in the sense of literacy or book choice (Durik et al. 2006). For instance, reading self-concept might affect whether students challenge themselves to read difficult books with complicated content or a complex linguistic structure or whether students choose to read long books, which might require more effort.

Intrinsic reading motivation and achievement

There is profound evidence that intrinsic reading motivation is one of the most important predictors of the development of reading achievement (e.g., De Naeghel et al. 2012; Hebbecker et al. 2019; McElvany et al. 2008; McGeown et al. 2015; Miyamoto et al. 2018; OECD 2003, 2010; Schiefele et al. 2016; Stutz et al. 2016), meaning that intrinsically motivated students tend to be better readers.

Reading behavior and achievement

Moreover, various studies have provided evidence that in addition to reading motivation, reading behavior promotes the development of reading achievement (e.g., R. C. Anderson et al. 1988; Guthrie et al. 1999; Jerrim and Moss 2019; Locher and Pfof 2019; McGeown et al. 2015; Mol and Bus 2011; OECD 2010; Pfof et al. 2013b; Suk 2017). As previously mentioned, however, the existing evidence on the relation between reading behavior and reading skills is predominantly based on studies considering quantitative aspects of reading, especially time spent reading. Therefore, beyond the well-replicated general positive relation between time spent reading and reading skills, it is unclear whether further aspects of reading behavior (e.g., text difficulty, book length, or number of books) affect the development of students' reading skills.

In sum, there is first evidence that reading self-concept, intrinsic reading motivation, reading behavior, and reading achievement are related to each other. Nevertheless, the reviewed studies indicate that there are some hitherto neglected questions requiring further investigation. As learning activities are specific to a given academic domain, we first ask whether we can replicate findings on the relations between self-concept, motivation, behavior, and achievement within the reading domain. Second, older studies examining reading self-concept (e.g., Chapman and Tunmer 1997; Kurtz-Costes and Schneider 1994) often measured reading achievement based on school grades. However, the relation between self-concept and school grades tends to be stronger than the relation between self-concept and achievement test scores (Marsh et al. 2005). In fact, school grades are only crude indicators of students' individual reading skills because teachers' judgments of students' achievement are strongly affected by social comparisons (Helmke and van Aken 1995; Schrader and Helmke 1990). Third, none of the reported studies analyzing the relation between reading behavior, reading self-concept, and achievement took into account information about books that have actually been read (book choice). Therefore, rather

than solely relying on unspecific measures of time spent reading, it is necessary to take into account characteristics of students' reading material (text difficulty, book length). And finally, despite frequent theoretical discussions, research on mediators of the relation between reading self-concept and reading achievement is still fragmentary.

Aims of the present study and research questions

There is evidence that the relation between academic self-concept and academic achievement goes in both directions (e.g., Valentine et al. 2004). Within this reciprocal model, the mechanism underlying the effect of academic self-concept on achievement (self-enhancement approach) more precisely only seems to be directly explainable through the initiation and persistence of learning behavior (Helmke and van Aken 1995). Therefore, in order to examine which aspects mediate the relation between self-concept and achievement in the reading domain, we asked the following question: Does reading self-concept predict students' amount of reading, book choice (text difficulty and book length), and intrinsic reading motivation, and do these aspects also affect later reading comprehension skills, thus mediating the relation between reading self-concept and reading comprehension?

Hypothesis 1. In accordance with self-enhancement theory and prior research (e.g., Valentine et al. 2004), we hypothesized that reading self-concept in Grade 8 would positively predict later reading comprehension in Grade 9 (H1).

Hypothesis 2. In accordance with expectancy-value theory (Wigfield and Eccles 2000) and prevalent research (Guay et al. 2010), we hypothesized a positive relation between reading self-concept in Grade 8 and intrinsic reading motivation in the sense of reading enjoyment in Grade 9 (H2.1). In accordance with the theory of reasoned behavior (Fishbein and Ajzen 2011) and existing studies (e.g., Durik et al. 2006), we hypothesized a positive relation between reading self-concept in Grade 8 and persistence and effort in reading-related habits in the sense of the absolute numbers of books that students read in their leisure time and their literacy choices with respect to book length and text difficulty in Grade 9 (H2.2).

Hypothesis 3. Prior research has provided strong evidence that reading behavior and intrinsic reading motivation positively predict students' reading achievement (e.g., Guthrie et al. 1999; McElvany et al. 2008; Pfost et al. 2013b). Therefore, we hypothesized that intrinsic reading motivation (H3.1) as well as amount of reading, book length, and text difficulty (H3.2) in Grade 9 would predict students' reading comprehension skills in Grade 9 and would consequently function as mediators of the relation between reading self-concept and reading comprehension (see Fig. 1).

Figure 1 illustrates our hypothesis and the theoretical model that we derived. There are some research studies indicating that the relation between intrinsic reading motivation and reading comprehension is mediated by aspects of reading behavior (e.g., McElvany et al. 2008; Stutz et al. 2016). By contrast, recent studies (e.g., De Naeghel et al. 2012; Soemer and Schiefele 2018; Troyer et al. 2018) have found no evidence that reading behavior mediates the relation between intrinsic reading motivation and reading comprehension but have found direct effects of intrinsic reading motivation on reading achievement. Therefore, we decided to consider intrinsic reading motivation and reading behavior-related aspects as separate mediators.

Hypothesis 4. As a consequence of Hypotheses 1, 2, and 3, we further hypothesize that intrinsic reading motivation and reading behavior mediate the relation between reading self-concept and reading comprehension. Given that students' prior

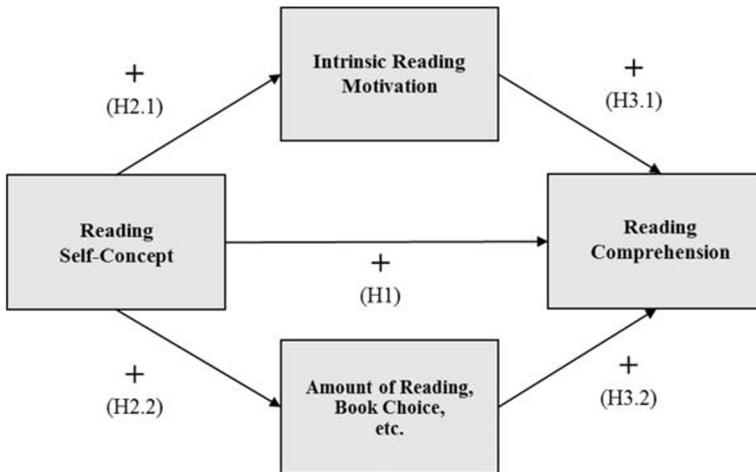


Fig. 1 The theoretical mediation model

achievement is an essential predictor of their later achievement as well as their academic self-concept, we controlled for students' prior reading comprehension, expecting to find the aforementioned mediation effect even when including this control variable.

Method

Design and participants

All analyses were computed on data from the German Bamberg BiKS-8-14 longitudinal study¹ ("Educational Processes, Competence Development, and Selection Decisions for Preschool and School-age Children"; Artelt et al. 2013; Pfof et al. 2013a), which included children from Grade 3 in elementary school to Grade 9 in secondary school. The sample that we analyzed was assessed in 2012, when the students were enrolled in Grade 9. Specifically, we investigated a sample of $N=405$ students who responded to a specific questionnaire asking for information about their reading habits in and out of school. In addition to the data gathered in Grade 9, we also used longitudinal data from these students gathered in Grades 7 and 8. The students' average age in Grade 7 was $M=13.34$ ($SD=0.39$) years; 60% of the sample was female, and about 7% indicated that they had a migration background, meaning that at least one parent had not been born in Germany. A total of 83% of the students in our sample attended upper track schools/gymnasium.²

¹ All data and complete information about the variables are available from the Institute for Educational Quality Improvement (IQB) https://doi.org/10.5159/IQB_BIKS_8_14_v2

² In most German states, children attend elementary school until the fourth grade. After the transition to secondary school, students are separated, usually according to their academic abilities, into academic track schools (Gymnasium), which prepare students for university admission, various nonacademic track schools (Hauptschule, Realschule), or comprehensive schools.

Measures

Reading self-concept

In Grade 8, we measured reading self-concept using an instrument that focused on the reading process itself. More precisely, we asked students to respond to three positive statements referring to beliefs and cognitive-evaluative components during reading or exposure to texts (“I am sure that I can also understand very difficult texts”; “I am sure that I can also handle complex texts that our teacher provides in German class”; “I think that I have the ability to understand texts well”). A 5-point Likert scale was used (1 = *completely disagree* to 5 = *completely agree*). The reading self-concept scale was adapted from the German PISA study (Hertel et al. 2014). Therefore, our items were similar (with slight changes) to the well-validated measure from PISA. The internal consistency was found to be very good ($\alpha = .85$).

Intrinsic reading motivation

In Grade 9, intrinsic reading motivation—in the sense of reading enjoyment—was measured with three positive statements (e.g., “Reading is one of my favorite hobbies”; “I enjoy getting a book as a present”; “I like going to the library or bookstore”) and one negative statement (“I read because I have to”) on the student questionnaire. The scale focused on aspects of reading enjoyment, which is one important facet of intrinsic reading motivation alongside others such as curiosity or involvement (Schiefele et al. 2012). A 4-point Likert scale was used (1 = *completely disagree* to 4 = *completely agree*). These items were also similar to those used in the German PISA study (Hertel et al. 2014). The internal consistency of the scale was very good ($\alpha = .89$).

Reading behavior

Reading behavior denotes all activities related to reading and can be operationalized in different ways (e.g., How much do you read? [quantitative aspect of reading]; What do you read? [qualitative aspect of reading]; Locher et al. 2019). In order to capture the full complexity of reading behavior, we relied on three different indicators, namely, text difficulty, book length, and reading amount. Text difficulty and book length were assessed using responses from the following open-ended question, which was asked in Grade 9: “Please indicate the title and author of a maximum of three books you have read for enjoyment in your leisure time in the past 6 months.” Therefore, we had data for a maximum of three books for recreational reading per student, resulting in 419 different book titles altogether.

Text difficulty

We used the readability index (LIX) as an objective measure of text difficulty (Lenhard and Lenhard 2014–2017). The LIX is an easy-to-use readability measure based on characteristics of the linguistic surface structure of a given text. The LIX readability index has been shown to be valid with respect to several criteria (J. Anderson 1983). A text’s LIX score is calculated by adding up its average sentence length and its percentage of long words (more than six letters): $LIX = (\text{number of words}/\text{number of periods}) + (\text{number of long words} * 100 / \text{number of words})$ (Lenhard & Lenhard, 2014–2017). We computed the LIX score using a computer-based tool to

analyze a text passage from each book the students had listed (Lenhard & Lenhard, 2014–2017). All text passages were drawn from the first page (excluding prefaces, etc.). In order to standardize the text passages analyzed, we always used an excerpt comprised of 500 words plus the number of words left until the end of the sentence containing the 500th word. According to Lenhard and Lenhard (2014–2017), the following categories can be considered as a rule of thumb: Books for children and adolescents tend to have a LIX score less than 40, fiction books have a LIX score between 40 and 50, nonfiction books have a LIX score between 50 and 60, and technical literature has a LIX score of more than 60. In our data set, the books' LIX scores ranged from 21.5 to 93.5. (For more information about the distribution of LIX scores, see Fig. A in the electronic supplement.) We ran further analyses in order to ensure that the text passages from the beginning of each book could be considered representative of the entire book. We randomly selected 30 books for which we additionally generated a text passage of 500 words + x words from the middle and the end of the book. We then used the three text passages from each book to estimate the ICC as a measure of rating reliability. The reliability (ICC = 0.75; $N = 30$) was found to be good.

Book length

Information from the student questionnaire (e.g., the titles and authors' names of the books that students read) was used to ascertain book length, defined as the number of pages that the book contained. We always used paperback versions of the book to calculate the number of pages. To confirm the quality of our ratings and demonstrate reliability, two raters coded the book titles independently with respect to length. Rater A coded all the books, and Rater B coded about 45% of the books. Interrater reliability was found to be very good (ICC = 0.99).

Amount of reading

To measure amount of reading, we used the total number of books that students indicated that they had read within the past 6 months. Students were asked the following open-ended question: "How many books did you read for enjoyment and in your leisure time during the past 6 months?" Because evaluating one's own reading behavior (especially without a frame of reference) can be a complex task, the initial data set contained outliers ($N = 20$). In order to handle these outliers, reported book totals higher than one standard deviation above the average (initial data set: $M = 8.04$, $SD = 12.69$) were recoded to match the cutoff value of 20—the average number of books plus one standard deviation.

Reading comprehension

We operationalized students' reading achievement by measuring students' reading comprehension skills. These skills were measured in Grades 7 and 9 with a paper-pencil-based test containing three texts of different types (newspaper article, passages from a classic fiction novel, and a nonfiction text), ranging in length from 440 to 560 words. For each of the three texts, between 7 and 12 multiple-choice items had to be answered. The test in Grade 7 had 26 items in total (timeframe: 22 min), and the test in Grade 9 had 29 items (timeframe: 25 min). The items required students to find specific information in the text, read across sentences, and generate basic inferences. The test in Grade 9 was not exactly the same as the one used in Grade 7, but they were similar in structure. The texts and questions were adapted to the

students' age to ensure that the test was of appropriate difficulty. The reading comprehension tests in the BiKS were constructed in close communication with reading experts from the German PISA consortium—for more detailed information regarding the test and the BiKS scientific use file, please see Artelt et al. (2013). For each measurement point, a sum score of correctly answered questions was used. The scale's internal consistency was good in Grade 7 ($\alpha = .83$) and satisfactory in Grade 9 ($\alpha = .72$).

Analysis strategy

Analyses were conducted in SPSS and Mplus 7 (Muthén & Muthén, 1998–2007). First, we computed descriptive statistics and zero-order correlations. Next, in order to clarify the nature of the relation between reading self-concept and reading comprehension, we ran a longitudinal path model, assuming indirect effects between reading self-concept in Grade 8 and reading comprehension in Grade 9 via LIX score, book length, amount of reading, and intrinsic reading motivation. We also included students' previous reading comprehension skills from Grade 7 as a control variable in our model. Because aspects of reading behavior and intrinsic reading motivation covary, we allowed correlations between the mediating variables. Because reading self-concept and intrinsic reading motivation were measured with three and four items each, we modeled these constructs as latent variables in our regression model. Because our sample consisted of students clustered in school classes, we used cluster robust standard errors to handle the nested data (TYPE = COMPLEX). We also used an MLR estimator, which is robust to the non-normality of observations. Results were tested at 5% and 1% significance levels. Missing data ranged from 0% (comprehension test) to 30% (LIX readability) on the item level and was treated with full information maximum likelihood (FIML) estimation.³

Results

Table 1 shows the means and standard deviations as well as intercorrelations of the observed variables. Reading self-concept was positively correlated with all variables except the LIX score. Furthermore, the results revealed significant correlations between reading comprehension at both time points and self-concept, intrinsic reading motivation, and amount of reading.

In order to examine differences in reading comprehension development longitudinally, we regressed reading comprehension in Grade 9 on reading comprehension in Grade 7 and reading self-concept in Grade 8. We also modeled indirect effects between reading self-concept and reading comprehension in Grade 9. Figure 2 shows the results of the mediated path model. Regression analyses revealed that reading comprehension in Grade 7 was positively related to self-concept in Grade 8 ($\beta = 0.36, p < 0.01$), as well as to amount of reading ($\beta = 0.26, p < 0.01$) and intrinsic motivation ($\beta = 0.30, p < 0.01$) in Grade 9. This means that students with higher reading comprehension skills have a higher reading self-concept and that these students read more books in their leisure time and are more motivated to read than poor readers. Reading self-concept was positively related to amount of reading ($\beta = 0.22, p < 0.01$), book length ($\beta = 0.19, p < 0.01$), intrinsic motivation ($\beta = 0.23, p < 0.01$), and reading comprehension ($\beta = 0.13, p < 0.05$) in Grade 9. This means that students who see themselves as good readers claim to read more and longer books in their leisure time, have a

³ Further information regarding missing data can be found in the electronic supplement.

Table 1 Intercorrelations of the observed variables

	<i>M (SD)</i>	(2)	(3)	(4)	(5)	(6)	(7)
Grade 7							
(1) Reading comprehension ^a	20.08 (4.02)	0.33**	0.36**	0.06	0.32**	0.01	0.57**
Grade 8							
(2) Reading self-concept	3.52 (0.75)	–	0.30**	0.16*	0.26**	0.00	0.31**
Grade 9							
(3) Reading motivation	2.78 (0.91)		–	0.23**	0.57**	–0.04	0.33**
(4) Book length	433.20 (178.96)			–	0.10	0.17**	0.05
(5) Amount of reading	5.35 (5.11)				–	0.01	0.17**
(6) LIX	38.24 (6.65)					–	–0.01
(7) Reading comprehension ^a	18.11 (4.04)						–

Note: * $p < 0.05$; ** $p < 0.01$; the means for reading comprehension in Grade 7 and Grade 9 are not directly comparable because different comprehension tests/items were used

higher motivation to read, and have better reading comprehension skills than students with a lower reading self-concept. Out of all the mediating variables considered, intrinsic reading motivation ($\beta = 0.20$, $p < 0.01$) was found to be most strongly related to reading comprehension in Grade 9. Book length ($\beta = -0.03$, *ns*) and amount of reading ($\beta = -0.12$, *ns*) were not significantly related to reading comprehension in Grade 9. LIX score was not related to reading self-concept or reading comprehension. Complementing the results presented in Fig. 2, Table 2 presents estimates of significant indirect paths. The results in Table 2 confirm what could be deduced from the results in Fig. 2. We did not find indirect effects between reading self-concept in Grade 8 and reading comprehension in Grade 9 mediated by LIX score, amount of reading, or book length. Although reading self-concept predicted amount of reading and book length, variables related to amount of reading and book choice had no effect on reading comprehension in Grade 9. We did find a significant indirect effect for intrinsic reading motivation ($\beta = 0.05$, $p < 0.05$), meaning that students' reading self-concept influences their intrinsic reading motivation, which in turn influences their reading comprehension level. The path model that included all variables explained 36% ($R^2 = .361$) of the variance in students' reading comprehension in Grade 9. The model-fit values were acceptable ($\text{Chi}^2 = 96.29$, $df = 38$; $\text{RMSEA} = 0.06$; $\text{CFI} = 0.96$) according to criteria recommended by Schermelleh-Engel et al. (2003).⁴

Discussion

The main goal of this study was to investigate the mechanisms mediating the effect of reading self-concept on reading comprehension. We expected that reading self-concept would predict intrinsic reading motivation as well as amount of reading and book choice (text difficulty and book length), which would in turn predict reading comprehension, therefore functioning as a mediator of this relation. However, we found only partial support for our hypotheses. In the following section, we first detail the results regarding the impact of reading self-concept on amount of reading, book choice, and reading motivation, before proceeding to discuss our findings on the mediation.

⁴ Results were the same when including individual's gender as a control variable in the model. Further information can be found in Fig. B of the electronic supplement.

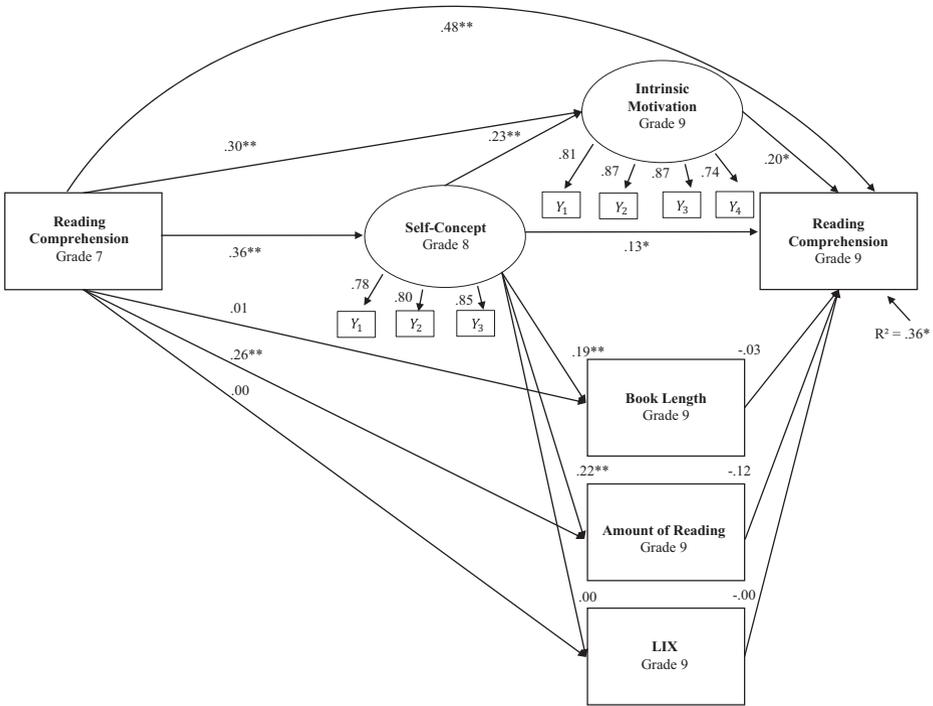


Fig. 2 Structural equation model estimating effects between reading self-concept and reading comprehension

The relation between reading self-concept and reading comprehension

The relation between reading self-concept and reading comprehension formed the starting point of our study. The three items that we used to measure reading self-concept were chosen for several reasons. First, due to time and space restrictions, students could only respond to three items. Second, we focused on cognitive-evaluative components of reading self-concept; whether affective components should be included is still subject to debate (e.g., Möller and Schiefele 2004). Third, we needed an instrument closely related to the reading process itself, as all variables should be located on the same level of specificity or related to the same content domain (specificity matching: Swann et al. 2007). In other words, a specific construct (reading self-concept) should be used to predict specific constructs (reading behavior and reading motivation). Our results showed a moderate positive relation between prior reading self-concept and later reading comprehension (H1): Reading self-concept in Grade 8 predicted reading comprehension in Grade 9, controlling for reading comprehension in Grade 7. Therefore, our results support our first hypothesis and provide support for the self-enhancement approach (Calsyn and Kenny 1977). Unfortunately, only one measurement point for reading self-concept was available. Consequently, we were unable to analyze changes in reading self-concept, a limitation that needs to be considered when interpreting these results and a research desideratum that might be addressed in forthcoming studies.

Table 2 Indirect effects within the regression model including reading self-concept, intrinsic reading motivation, and reading comprehension

Path	β	S.E.	95% CI
Reading comprehension G7, amount of reading, reading comprehension G9	-0.03	0.02	[-0.07, 0.01]
Reading comprehension G7, book length, reading comprehension G9	0.00	0.00	[-0.01, 0.01]
Reading comprehension G7, LIX, reading comprehension G9	0.00	0.00	[-0.01, 0.01]
Reading comprehension G7, self-concept G8, reading comprehension G9	0.05*	0.03	[0.00, 0.09]
Reading comprehension G7, intrinsic motivation, reading comprehension G9	0.07*	0.03	[0.02, 0.12]
Reading comprehension G7, self-concept, amount of reading, reading comprehension G9	-0.01	0.01	[-0.02, 0.00]
Reading comprehension G7, self-concept, book length, reading comprehension G9	-0.00	0.01	[-0.01, 0.01]
Reading comprehension G7, self-concept, LIX, reading comprehension G9	0.00	0.00	[-0.00, 0.00]
Reading comprehension G7, self-concept, intrinsic motivation, reading comprehension G9	0.02*	0.01	[0.00, 0.04]
Self-concept, amount of reading, reading comprehension G9	-0.03	0.02	[-0.06, 0.01]
Self-concept, book length, reading comprehension G9	-0.01	0.01	[-0.03, 0.02]
Self-concept, LIX, reading comprehension G9	0.00	0.00	[-0.01, 0.01]
Self-concept, intrinsic motivation, reading comprehension G9	0.05*	0.02	[0.01, 0.10]

Note: * $p < 0.05$; ** $p < 0.01$; STDYX standardized results; G = grade; numbers represent the students' grade level; CI of indirect effects were estimated in a bootstrapping model without using TYPE = COMPLEX; bootstrap results are based on 2000 bootstrap samples

Reading self-concept's relations to amount of reading, book choice, and reading motivation

In general, a high academic self-concept is assumed to influence school-related choices, specific learning behaviors, persistence, and the extent to which effort is self-initiated (e.g., Dickhäuser 2006; Helmke and van Aken 1995; Köller et al. 2006). The results of our study showed that students' reading self-concept influenced their intrinsic reading motivation as well as their reading behavior. Hence, we were able to establish an empirical basis for our general assumptions with respect to the reading domain, as our results showed that students with a higher reading self-concept enjoyed reading more, read more books, and challenge themselves to read longer books. This supported our theoretical assumptions (H2). Regarding intrinsic reading motivation, our results stand in contrast to Skaalvik and Valås (1999), who found no evidence that verbal self-concept predicts subsequent reading motivation or achievement. However, in comparison to the present study, Skaalvik and Valås (1999) focused on younger (i.e., elementary and middle school) students from Norway and examined general verbal self-concept (instead of reading self-concept). Therefore, the lack of associations between verbal self-concept, reading achievement, and reading motivation reported by Skaalvik and Valås (1999) might be attributable to the fact that their measures were located on different specificity levels. With respect to amount of reading, our study is in line with findings from Baker and Wigfield (1999), Park (2011), and Durik et al. (2006), who showed that reading self-concept is related to amount or volume of reading.

Moreover, by considering students' actual book choice, our study provides further evidence on the consequences of reading self-concept. Whereas students' reading self-concept predicted book length, operationalized as the number of pages that the book contained, the LIX score, as a measure of text difficulty, was not related to reading self-concept. This means that we found no evidence that students with a higher reading self-concept read more difficult books compared to students with a lower reading self-concept. By arguing that reading self-concept predicts aspects of reading behavior, we assume that students choose the amount of reading to engage in and the difficulty of the texts that they read according to their perceived competence levels. However, readability is typically not printed on a book's cover. Therefore, students might use other criteria to evaluate whether they might be able to read a certain book or not. By contrast, book length, defined as the number of pages that a book contains, is a much more obvious indicator. Thus, it allows students to ask themselves questions: Will I be able to read such a long book, or is it too hard for me, as a poor reader, to concentrate for so long? This idea was also supported by our results.

Reading comprehension's relations with amount of reading, book choice, and reading motivation: the mediation model

First, our results revealed that reading self-concept predicted intrinsic reading motivation (H2.1), which in turn influenced students' reading comprehension level (H3.1). This finding of an indirect path (H4.1) went along with our expectations based on the expectancy-value theory of motivation (Wigfield and Eccles 2000) and results from Guay et al. (2010), who found a similar relation between general school self-concept and general school achievement. Therefore, our findings indicate that this rather general mediation model that applies across domains also seems to be valid for the reading domain. This finding highlights the importance of students' reading self-concept, because even after controlling for previous reading

comprehension skills, reading self-concept significantly predicted intrinsic reading motivation and, in turn, future reading comprehension skills. In other words, despite comparable reading skills, students who viewed themselves as good readers experienced a stronger motivation to read and therefore attained higher reading skills in the future. Keeping in mind the fact that intrinsic reading motivation has been shown to decrease during secondary school (Chapman and Tunmer 1995; McKenna et al. 1995; Smith et al. 2012), creating instructional contexts where students can experience themselves as competent and, in turn, more motivated readers might be an important potential starting point.

Second, our results gave no indication that students who read more books, longer books, or more difficult books exhibited any improvement in reading comprehension skills (H3.2), and in turn, we found no mediating effects of these factors (H4.2). In our opinion, the following aspects might explain this unexpected result. First, one might conclude that it is not the difficulty or the length of a book that fosters reading comprehension. According to prominent research (e.g., R. C. Anderson et al. 1988; Pfof at al. 2013b), frequent reading seems to be most important for students' reading comprehension development. This might also hold true for amount of reading (total number of books), meaning that it might be more beneficial for students to read on a daily basis or at least regularly, rather than, for instance, reading three books in 1 week on vacation and "nothing" the rest of the year. In other words, it seems to be very important for students to continuously practice reading. Another explanation for the nonsignificant effect on text difficulty relates to the distribution of the LIX scores. Perhaps we found no support for a relation between text difficulty and reading comprehension or reading self-concept because we did not have enough variability in the difficulty level of the indicated books. The mean value and the distribution of the LIX showed that only a small number of books read by students had a high LIX readability index, which is indicative of a more complex text structure. Furthermore, it is possible that the path from amount of reading to reading comprehension was nonsignificant due to the variance that these variables share with intrinsic reading motivation.

Limitations

No research comes without limitations that need to be considered when interpreting the results. First, the sample that we used for our analyses was predominantly comprised of students from academic track schools. Because the BiKS-8-14 is a large-scale longitudinal study and we used data from a subsample at the last measurement point, we had a smaller and no longer representative sample for the analyses at the end. Therefore, our results should be considered in light of the overrepresentation of academic track students in the sample. Moreover, potential overall mean differences should be assumed regarding variables such as reading comprehension level. Second, LIX scores are a rough indicator based on the linguistic surface structure of a text. Although such indicators may be quite good proxies for text difficulty (e.g., Fry 1968; Klare 2000; Norris and Ortega 2009), further characteristics may also be important. Linguistic indicators that reach deeper (e.g., propositional density or textual cohesion) might have provided different results. Similarly, the total number of books that students reported reading is a relatively rough indicator of their actual amount of reading. It might have been helpful to include other measures (e.g., the well-validated and frequently used global evaluation of daily reading time) to strengthen our model (Locher and Pfof 2018). Third, although our analyses profited from a longitudinal study design, we did not examine reciprocal effects but rather focused exclusively on the self-enhancement approach. The pathways that we examined in our

study were based on theoretical models and previous empirical results; nevertheless, future research could also take into account a different causal ordering of the relations. Some prior research has indicated that the relation between intrinsic reading motivation and reading skills is mediated by reading behavior (e.g., McElvany et al. 2008; Stutz et al. 2016). Therefore, future research could consider reading behavior as an additional mediator (between intrinsic reading motivation and reading comprehension) when explaining the mechanisms behind the relation between reading self-concept and reading comprehension. However, recent studies (e.g., De Naeghel et al. 2012; Soemer and Schiefele 2018; Troyer et al. 2018) found no evidence that reading behavior mediates the relation between intrinsic reading motivation and reading comprehension, but they did find direct effects of intrinsic reading motivation on reading achievement. Therefore, we decided to consider intrinsic reading motivation and reading behavior as separate mediators. Fourth, our study focused on traditional book reading, because reading books, as compared to other types of text (e.g., magazines or comic books), seems to be the most important predictor for reading skill development (e.g., Jerrim and Moss 2019; Pfost et al. 2013b). Nevertheless, it might be worthwhile for future studies to also include other types of text. Fifth, self-concept shares several characteristics with self-efficacy, which is why it is sometimes difficult to clearly distinguish between the two constructs (Bong and Clark 1999). In our analyses, we used items to measure reading self-concept that have been validated within the PISA framework (Hertel et al. 2014). These items ask about beliefs regarding reading and understanding texts in general. A comparable approach to measuring reading self-concept can be found, for example, in the study by Retelsdorf et al. (2014).

Conclusion and implications

In summary, our study provides a first indication of the mechanisms at work behind the relation between reading self-concept and reading achievement (self-enhancement approach) or, in other words, the factors that are influenced by reading self-concept and in turn influence students' reading comprehension development. Being able to understand such paths and individual differences in students' reading comprehension development is especially important for teachers, because such knowledge can serve as a basis for choosing instructional objectives or materials to foster students' literacy development (Duke and Carlisle 2010). According to our findings, intrinsic reading motivation serves as a significant mediator of the relation between reading self-concept and reading comprehension. Furthermore, in our study, we considered the actual books that students chose to read as a way to obtain more information about the quality of students' reading material (e.g., objective text difficulty). On this basis, we were able to show that students with a higher self-concept read more and longer books. However, the aspects of students' reading habits that we examined did not seem to be significant predictors of students' reading comprehension development, and as a consequence, they played no mediating role. Therefore, it might be interesting to include other measures, such as students' use of different strategies while reading, their metacognitive abilities, other measures of complexity/difficulty, and reading engagement as mediating variables in future studies to explain the nature of the relation between self-concept and skill development in reading.

Our results once again make clear how important it is for adolescents to perceive themselves as competent readers. Consequently, promoting students' reading self-concept should be a major goal of instruction alongside promoting students' reading skills. Hence, in terms of implications for teaching and learning, choosing literature which is not too difficult/complex and involving students more in decisions about which texts and books to read in school might

help to achieve this goal, because such practices give students the opportunity to experience success and enjoyment while reading. In order to design interventions that promote students' self-concept, applying concepts in line with self-determination theory (Deci and Ryan 2000), such as a high level of autonomy in reading decisions, might be a good starting point.

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