Disentangling the Motivation-Achievement Paradox of Immigrant Students

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Ai Miyamoto
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Dekan/Dekanin: Universitätsprofessor/-in Prof. Dr. Jörg Wolstein
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Zweitgutachter/-in: Universitätsprofessor/-in Prof. Dr. Cornelia Kristen

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1. Introduction

Today, Germany has become the world's second most popular destination country for immigrants after the United States (OECD, 2017). As immigration seems to be an essential source of labour force and population growth in Germany, "immigrant integration" has become a hot topic of discussion for educators, researchers, and policy makers. Language plays a significant role in the process of immigrant integration into the destination country, particularly, in the context of education (Esser, 2006a; 2006b). The ability to comprehend written text in the language of instruction is a fundamental precondition for successful integration of immigrant students into the educational system of the destination country. Therefore, finding ways to improve language competence of the destination country for students with an immigration background is one of the most important missions for educational researchers in the increasingly globalized society.

Students with an immigration background tend to show similar or sometimes even higher intrinsic motivation compared to their native peers (Kigel, McElvany, & Becker, 2015, Miyamoto, Pfost, & Artelt, 2018; Villiger, Wandeler, & Niggli, 2014). Despite relatively strong learning orientations, immigrant students tend to have, on average, significantly lower reading achievement compared to their native peers, even after controlling for families' educational and socio-economic backgrounds (OECD, 2010). *The motivation-achievement paradox,* or a seemingly weaker relationship between intrinsic motivation and reading competence for immigrant students in comparison to their native peers, is a puzzling phenomenon. Although a similar phenomenon has been reported for related constructs in previous research (e.g., Mickelson, 1990 for attitude-achievement paradox; Hill & Torres, 2010 for aspiration-achievement paradox), few research has investigated the mechanism behind this phenomenon. In addition, it is important to disentangle this paradox as there may be practical implications with the aim of helping immigrant students improve their reading achievement. Thus, the goal of this dissertation is to provide a theoretical and empirical explanation for a possible reason why immigrant students may have more difficulties in translating their relatively strong intrinsic motivation into their reading achievement compared to their native peers.

In this dissertation, I will first present my theoretical argument for a possible

explanation to the motivation-achievement paradox (Section 2). Second, I will propose my central research questions and hypotheses for this dissertation (Section 3). Third, I will summarize the results from the three empirical studies I have conducted (Section 4). Finally, I will discuss my findings and practical implications for future research, schools, and teachers (Section 5).

2. Explaining the motivation-achievement paradox of immigrant students

In line with the Self-Determination Theory (STD; Deci & Ryan, 1985), intrinsic motivation is defined as "the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000, p.56). In the context of reading, intrinsically motivated students read because the process of reading is inherently interesting, enjoyable, and rewarding (e.g., Schiefele, Schaffner, Möller, & Wigfield, 2012). Intrinsic motivation is often contrasted to extrinsic motivation, which is created when students read for external or instrumental reasons such as obtaining good grades or pleasing teachers and parents (e.g., Becker, McElvany, & Kortenbruck, 2010). Although extrinsic motivation is shown to be barely or sometimes negatively related to reading competence, intrinsic motivation is consistently shown to be positively related to reading competence even after controlling for students' cognitive abilities and family backgrounds (Andreassen & Bråten, 2010; Becker e al., 2010; Law, 2009; Schaffner & Schiefele, 2016; Schaffner, Schiefele, & Ulferts, 2013; Wang & Guthrie, 2004).

Despite relatively strong intrinsic motivation, immigrant students tend to have, on average, significantly lower reading achievement compared to their native peers (e.g., OECD, 2010). *The motivation-achievement paradox,* or a seemingly weaker relationship between intrinsic motivation and reading competence for immigrant students in comparison to their native peers, is a puzzling phenomenon. In this section, in order to disentangle the paradox, I aim to discuss relevant literature and to present my argument for a possible reason why immigrant students may have more difficulties in translating intrinsic motivation into reading achievement compared to their native peers. In the first step, I will briefly introduce the background of immigrant students in Germany and operationally define the immigration background which will be used throughout this dissertation (Section 2.1.). This is because Germany has a unique migration history and a very heterogeneous composition of immigrants; therefore, it is important to better understand the background of immigrants and to set a clear definition of "students' immigration background" in the beginning.

In the next step (Section 2.2.), I will discuss three matters that need to be clarified prior to testing an explanation for the motivation-achievement paradox. First, I will discuss the necessity of testing the measurement invariance of intrinsic motivation between native and immigrant students. This is because it is a precondition for testing an explanation for the motivation-achievement paradox as it allows a statistical comparison of the relationship between intrinsic motivation and reading competence

across groups. Following that, I will review and discuss previous literature on directionality of the relationship between intrinsic motivation and reading competence as well as mediating processes of how intrinsic motivation is transformed into reading achievement. This is done for the purpose of better understanding and clarifying the nature of the relationship between intrinsic motivation and reading competence which may be relevant and necessary for examining how this relationship may differ between native and immigrant students. Finally, with the aim of explaining the motivation-achievement paradox, I will introduce my theoretical argument for a possible reason why the relationship between intrinsic motivation and reading achievement may be weaker for immigrant students compared to their native peers (Section 2.3.).

2.1. Immigrant students in the German school system

Over time, the population of immigrant students in the German school system has risen in volume; and it has become more diverse regarding the regions of origin and their families' migration motives. The current student composition reflects crucial phases of Germany's post-war immigration history.

One important group of students consists of children of labour migrants from Southern Europe and Turkey who were recruited in the late 1950s and thereafter to fill shortages in the lower-qualified segments of the labour market. Subsequent family migration continued after the recruitment period ended in 1973. Today, students of Turkish origin make up one of the largest immigrant groups in the German school system (Gresch & Kristen, 2011; Olczyk, Seuring, Will, & Zinn, 2016).

In the 1990s, following the fall of the Iron Curtain, the so-called '(Spät-) Aussiedler' altered the composition of the migrant population. Due to their German ancestry, they received citizenship upon arrival and were eligible for state assistance to support their social and economic integration (Haberfeld, Cohen, Kalter, & Kogan, 2011). Most of them came from the territory of the former Soviet Union (FSU), but many also from other Eastern European countries. The FSU students in our study mostly belong to this group of '(Spät-) Aussiedler". Today, together with the Turks, these students constitute the numerically most important migrant group in the German school system (Gresch & Kristen, 2011; Olczyk et al., 2016). The qualification levels of their parents are more favourable compared to those of Turks: About half of them have acquired a post-secondary or tertiary degree (Kogan, 2011).

A third important development is related to internal migration within the European Union in the aftermath of its substantive enlargement in 2004. In that year a number of Eastern European countries joined the European Union, one of them being Poland. Migration from Poland and from other Eastern European countries continues to be important, possibly further changing the student body in the near future. Recent Polish migrants seem to be well educated; many of them have acquired a tertiary degree (Kristen, Mühlau, & Schacht, 2016; Will, 2016).

Students' immigration background can be operationally defined differently, such as by citizenship, ethnic origins, generation status, and language use. In this dissertation, for Study 1, and 2, students' immigration background is defined based on children and their parents' countries of birth. Children who were not born in Germany and whose mothers and fathers were also not born in Germany (first generation immigrants) as well as children who were born in Germany and whose mothers and fathers were not born in Germany (second generation immigrants) will be defined as immigrant students. Children who were born in Germany and at least one of their parents were also born in Germany are considered to be native students, or students without an immigration background. This is because previous research including the PISA framework (e.g., OECD, 2010) consistently suggests that first and second generation immigrants seem to be especially disadvantaged in reading achievement compared to the majority students. Therefore, it is particularly important for this dissertation to focus on this group of immigrants. In addition, In Study 3, immigrant students will be further distinguished based on their ethnic origins (Turkey, former Soviet Union, and Poland) as ethnic groups may differ in their exposure to the destination language in daily interactions, which may be relevant for their language-related competences.

2.2. Clarifications before explaining the motivation-achievement paradox

Before proposing and testing an explanation for the motivation-achievement paradox, there are several matters that need to be discussed and clarified: a) measurement invariance of intrinsic motivation between native and immigrant students, b) directionality of the relationship between intrinsic motivation and reading achievement, and c) mediating processes of how intrinsic motivation is transformed into reading achievement.

According to the immigrant optimism hypothesis (Kao & Tienda, 1995), immigrants often move to other countries with the aim of socio-economic improvement,

and they seem to perceive their child education as a key to their upward mobility. For instance, parents of Turkish origin in Germany reported that they wish their children to obtain opportunities for better future outcomes through attaining higher educational qualifications (Relikowski, Yilmaz, & Blossfeld, 2012). Compared to native parents, immigrant parents tend to possess significantly higher educational expectations for their children. Higher parental educational expectations often go along with children's positive learning attitudes such as high levels of intrinsic motivation (Villiger et al., 2014). In addition, the blocked opportunities hypothesis (e.g., Kao & Tienda, 1998; Sue & Okazaki, 1990) assumes that perceived structural and social barriers to academic success spur high educational ambitions and positive educational attitudes as a reaction. Immigrant parents may encourage their children to overcome social challenges such as anticipated discrimination by attaining high educational levels, therefore fostering their children's intrinsic motivation (Salikutluk, 2016).

Due to such higher parental expectations and often experienced social boundaries as a result of immigration, it is possible that students of immigrant origin may interpret the statements on the scale of intrinsic motivation differently from the way native students do. For example, immigrant students may interpret some items of intrinsic motivation as a reflection of a need for fulfilling their parental expectations or a drive for overcoming structural and social challenges. Possible differences in the interpretations of the items measuring intrinsic motivation between native and immigrant students, could potentially bias the results of the comparison between groups with regard to the strength of the relationship between intrinsic motivation and reading competence. Thus, the measurement invariance of intrinsic motivation between native and immigrant students needs to be achieved as a precondition for investigating an explanation for the motivation-achievement paradox of immigrant students.

Another important matter to discuss prior to testing an explanation for the motivation-achievement paradox is directionality of the relationship between intrinsic motivation and reading achievement. There are several possibilities for directionality of the relationship between intrinsic motivation and reading achievement, and previous research seems to provide mixed results on this matter. Three theoretical models can be considered for directionality of the relationship between intrinsic motivation and reading achievement: a) the self-enhancement model, b) the skill-development model, and c) the reciprocal effects model (Calsyn & Kenny, 1977; Guay, Marsh, & Boivin, 2003). Although these models were originally developed for investigating the causal ordering of the relation between self-concept and reading achievement, they have been

applied to investigate the relations between intrinsic motivation and achievement as well (e.g., Marsh, Lüdtke, Köller, & Baumert, 2005).

In the self-enhancement model, intrinsic reading motivation is regarded as a precursor of reading achievement rather than a consequence. This is due to the assumption that students who are intrinsically motivated tend to spend more time on reading activities and use effective comprehension strategies, and therefore develop stronger reading competence compared to students who are not intrinsically motivated (e.g., Schiefele, et al., 2012). This model has been supported by several longitudinal studies. Retelsdorf, Köller, and Möller (2011) found that intrinsic reading motivation (particularly reading for interest) significantly predicted reading comprehension growth from Grades 5 to 8 even after controlling for cognitive skills, family characteristics, and demographic variables. Guthrie et al. (2007) found a significant effect of intrinsic reading motivation (interest in reading, preference for choice, and involvement) on reading competence growth but observed no significant effect of reading competence on growth in reading motivation.

In contrast, in the skill-development model, intrinsic reading motivation is considered to be a result of reading achievement rather than an antecedent. This is due to the assumption that as competent readers understand texts at a deeper level, they may experience more positive emotions such as enjoyment and interest in reading compared to incompetent readers. This model has been supported by Becker et al. (2010) who investigated reciprocal effects of intrinsic motivation and reading competence and found that Grade 3 reading competence significantly predicted Grade 4 intrinsic reading motivation, while Grade 4 intrinsic reading motivation did not significantly predict Grade 6 reading competence.

The reciprocal effects model proposes that intrinsic motivation is an antecedent as well as a result of reading competence. From a theoretical and empirical perspective, the reciprocal-effects model seems to be the most convincing (Morgan & Fuchs, 2007). However, only a few longitudinal studies (McElvany, Kortenbruck, & Becker, 2008; Schaffner, Philipp, & Schiefele, 2014; Schiefele, Stutz, & Schaffner, 2016) have provided strong empirical support for this model. In a sample of second and third graders, Schiefele et al. (2016) observed reciprocal cross-lagged effects between intrinsic motivation (reading involvement) and reading comprehension at the word and sentence levels. In addition, McElvany et al. (2008) also observed reciprocal cross-lagged effects between intrinsic reading motivation and reading comprehension from Grades 3 to 4. Finally, Schaffner et al. (2014) observed reciprocal cross-lagged

effects between intrinsic reading motivation and reading competence from Grades 5 to 6 for students from academic track schools.

Finally, mediating processes of how intrinsic motivation can be transformed into reading achievement have to be better understood and clarified before examining an explanation for the motivation-achievement paradox. According to previous research, *reading amount*, often measured with the frequency of reading, is found to mediate the effect of intrinsic reading motivation on reading competence (Schaffner et al., 2013; Stutz, Schaffner, & Schiefele, 2016). The mechanism of how intrinsically motivated students tend to improve their reading comprehension through an increased amount of reading involves the following steps. First, intrinsically motivated readers tend to genuinely enjoy reading because it is rewarding and satisfying in itself (Schiefele et al., 2012). Second, readers' positive emotions experienced during the reading processes may reinforce them to seek more reading activities in the future. This assumption is also empirically confirmed that readers with higher intrinsic reading motivation tend to read more often than readers with lower intrinsic reading motivation (Guthrie, Wigfield, Metsala, & Cox, 1999; Wigfield & Guthrie, 1997). Finally, through motivated readers' increased engagement in reading, basic reading processes such as word-decoding can be more automatized; therefore, more attention can be remained for text comprehension at a deeper level (LaBerge & Samuels, 1974; Samuels, 1994). This assumption is based on the theory of automatic information processing (LaBerge & Samuels, 1974), which suggests that the printed words must be first decoded, and then comprehended in order to understand the meaning of the printed words (Samuels, 1994).

From a theoretical perspective, it is plausible to assume that intrinsically motivated readers tend to improve their reading competence as they spend more time on reading activities. However, there seems to be lack of strong empirical evidence for the mediating effect of reading amount on the relationship between intrinsic motivation and reading competence. While some studies have found significant mediating effects of reading amount on the relationship between intrinsic motivation and reading competence (Schaffner et al., 2013; Stutz et al., 2016), other studies did not find such effects (De Naeghel, Van Keer, Vansteenkiste, & Rosseel, 2012; Wang & Guthrie, 2004).

Moreover, until this time, only a few studies (Becker et al., 2010; McElvany et al., 2008; Schaffner & Schiefele, 2016) have examined indirect effects of intrinsic reading motivation on reading competence through reading amount using longitudinal data. Schaffner and Schiefele (2016) investigated effects of intrinsic reading motivation

on the word and sentence level comprehension before and after six-weeks of summer vacation in a sample of third graders. Their results revealed that the effect of intrinsic reading motivation on the post-vacation reading comprehension was significantly mediated by reading amount when controlling for the pre-vacation reading comprehension. McElvany et al. (2008) investigated mutual relations among intrinsic reading motivation, reading amount, and reading comprehension from Grades 3 to 6. They found a small but significant indirect effect of Grade 3 intrinsic reading motivation on Grade 6 reading comprehension through Grade 4 reading amount. Using the same data set as McElvany et al. (2008), Becker et al. (2010) also observed a significant indirect effect of Grade 4 intrinsic reading motivation on Grade 6 reading comprehension through Grade 4 reading amount.

In addition to the amount of reading, the effective use of reading strategies is also considered to be important for mediating the relationship between intrinsic motivation and reading competence (Schiefele et al., 2012; Taboada, Tonks, Wigfield, & Guthrie, 2009). Intrinsically motivated readers tend to be deeply engaged with texts (e.g., getting lost in a story, experiencing imaginative actions, and empathizing with the characters), and such reading involvement is found to be positively associated with the use of elaborated and deep-level comprehension strategies (Guthrie et al., 1996; Schiefele et al., 2012). In other words, due to the deep engagement with texts, intrinsically motivated readers are more likely to select and apply strategies which help them understand texts better. Such effective use of reading strategies helps students with various comprehension processes including activating information in working memory, storing information into long-term memory, selecting important information, and constructing connections between those pieces of information (McKeachie, Pintrich, Lin, & Smith, 1986). The effective use of strategies also supports readers in monitoring their comprehension processes and modifying the way they read in order to facilitate their efforts to decode a text, understand words, and construct the meaning of a text (Anastasiou & Griva, 2009).

Taken together, from a theoretical perspective, intrinsically motivated readers are likely to engage in extensive use of reading strategies, and the extensive use of strategies tend to help them develop stronger reading competence. However, there seems to be lack of strong empirical evidence for the mediating role of the use of reading strategies in the relationship between intrinsic motivation and reading competence. Anmarkrud and Bråten (2009) examined relations between intrinsic motivation (i.e., reading task value), self-reported frequency of strategy use, and reading

comprehension in a sample of ninth-grade Norwegian students. The results showed that self-reported frequency of strategy use was not found to be significantly related to reading comprehension, indicating no sign of mediating effects of self-reported frequency of strategy use on the link between intrinsic motivation and reading comprehension.

One possible reason for the scarcity of evidence for the mediating role of reading strategy use may be attributed to the methodological weaknesses of using self-report questionnaires. Self-report questionnaires are the most frequently used instruments for measuring the use of strategies in previous research, possibly due to the convenience in design, administration, and evaluation (Gascoine, Higgins, & Wall, 2017; Winne & Perry, 2000). However, the use of self-report measures has been criticized as it often only takes into account the quantitative aspects of strategy use and disregards the qualitative aspects (Händel, Artelt, & Weinert, 2013). Previous research has shown that good readers and poor readers use the same types of strategies, but good readers use strategies more effectively than poor readers do (Grabe, 2009). In order to comprehend a text, it is important for students to be aware of "which" strategies to use, as well as "when" and "how" to use those strategies (Artelt, 2000). Thus, instruments should capture how effectively people use strategies rather than merely how often people use strategies. Another criticism associated with the use of self-report measures is that it only reflects the perceived use of strategies and not necessarily the actual usage of strategies (Artelt & Schneider, 2015). For instance, readers' perceptions of strategy use may not be accurate, as some of the complex strategies (e.g., relating the text content to personal experiences) may be used automatically and unconsciously.

Acknowledging such methodological limitations of self-report measures, Artelt and Neuenhaus (2010) recommended the use of measures of "metacognitive knowledge of strategy use (declarative metacognition)" as an alternative indicator. Metacognitive knowledge of strategy use includes qualitative aspects of strategy use as it measures the awareness or knowledge of how and when certain strategies could best be applied during reading. Metacognitive knowledge of strategy use is often measured with a scenario-based metacognitive knowledge test (e.g., Neuenhaus, Artelt, Lingel, & Schneider, 2011). Students are given a scenario such as "you have to understand and memorize a text," then provided with various strategies such as, "I concentrate on the parts of the text that are easy to understand," "I underline important parts of the text," and "I read the text aloud to another person." The strategies presented vary in their effectiveness to deal with the learning situation, and the students are required to

evaluate the usefulness of each strategy in relation to other presented strategies (Neuenhaus et al., 2011). In addition, the effectiveness of each strategy is often coded based on the judgments of experts, providing a clear benchmark of evaluation (Händel et al., 2013). Using the data from PISA 2009, Artelt and Schneider (2015) investigated the relationships between metacognitive knowledge of strategy use, self-reported frequency of strategy use, and reading comprehension using 34 national samples. They found that metacognitive knowledge of strategy use predicted reading comprehension more strongly than the self-reported frequency of strategy use did. Their findings also imply that metacognitive knowledge of strategy use seems to be a better indicator for the effectiveness of strategy use in comparison to self-reported frequency of strategy use.

So far, only one study to authors' knowledge (van Kraayenoord & Schneider, 1999) has provided strong empirical evidence for the mediating role of metacognitive knowledge of strategy use in the relationship between intrinsic motivation and reading comprehension. They found that intrinsic motivation (i.e., reading interest) positively predicted metacognitive knowledge of strategy use, which in turn positively predicted reading comprehension.

2.3. A potential explanation to the motivation-achievement paradox

According to a general model of learning (Chiswick & Miller, 1995; 2001), which has previously been applied to different learning outcomes across disciplines, such as the acquisition of language competences of immigrant students, learning investments can be expected to differ across individuals and groups, depending on the *incentives* associated with learning, the degree of *exposure* to various learning environments and the *efficiency* with which individuals acquire new skills per unit of exposure. Within this framework, intrinsic motivation can be regarded as a proxy for the construct of "incentives". Higher levels of intrinsic motivation should serve as an incentive to self-select into activities that provide favourable conditions for learning and thereby contribute to achievement. Apparently, the consequences of engaging in certain activities can be linked to other components of the learning model – particularly to exposure. However, incentives come first in the sense that they stimulate individuals to engage in certain behaviours that provide opportunities that benefit learning. Taking reading as an example, a person who is intrinsically interested in reading tends to spend more time reading, uses more effective reading strategies and prefers more challenging reading materials than those who are less interested in reading (Schiefele et al. 2012).

Interest should also increase a reader's attention and result in the reader engaging in deeper information processing (Hidi, 2001). These processes can be assumed to positively contribute to students' reading competence.

These processes are expected to apply to all students similarly. However, for immigrant students, the strength of the link between incentives and learning outcomes might be weaker. I address this motivation-achievement paradox by proposing a conditional view. Children and youth of migrant origin must have access to environments that provide favourable conditions for learning. An important condition that seems to be particularly relevant for immigrant students' language-related achievement is the opportunity to communicate in the language of instruction in everyday interactions. To transform favourable orientations into achievement, it is essential to have access to learning environments that provide the opportunity to communicate in the language of instruction in everyday interactions.

In a general learning model, this reasoning is related to the construct of exposure. The idea behind this concept is that compared to those with less exposure, immigrant students who are exposed to the language of the destination country on a regular basis should have better opportunities to communicate in the destination language, which is a necessary condition for students to transform higher levels of intrinsic motivation into reading achievement. This view emphasizes a multiplicative relationship between the two factors, according to which exposure is a necessary condition for incentives to effectively promote learning (Esser, 2006a; 2006b). In other words, learning opportunities such as having access to an environment where students are exposed to the destination language on a regular basis, should moderate the relationship between intrinsic motivation and reading achievement. Taken together, one possible reason why immigrant students may have more difficulties in transforming intrinsic motivation into reading achievement compared to their native peers may be due to immigrant students' limited opportunities to communicate in the destination language in daily interactions.

In addition, while investigating the explanation to the motivation-achievement paradox, several relevant factors need to be taken into account such as types of school tracks, language use for reading, and ethnic heterogeneity of immigration backgrounds. In Germany, school tracks can be largely divided into either an academic track which typically prepares students for higher education, or a nonacademic track which emphasizes more on practical education and vocational training. 34.2% of secondary school students in Germany enroll in academic track schools whereas the remaining

students attend nonacademic track schools (Statistisches Bundesamt, 2016). Schaffner et al. (2014) investigated the influence of different track schools on the reciprocal relations between intrinsic reading motivation and reading competence from Grades 5 to 6. Their results revealed that significant and positive reciprocal relations between intrinsic reading motivation and reading competence were observed for academic track students, but not for nonacademic track students. Neither intrinsic reading motivation nor reading competence significantly predicted each other for nonacademic track students. This finding implies that the relationship between intrinsic motivation and reading competence seems to be weaker for students from nonacademic track schools than for students from academic track schools.

According to Schaffner et al. (2014), this is due to the assumptions that (1) the effect of intrinsic motivation on reading comprehension is mediated by the amount of reading (Schiefele et al., 2012); (2) intrinsically motivated reading amount influences reading competence only when students read challenging texts and deeply engage in comprehension processes (Carver & Leibert, 1995); and (3) academic track schools are more likely to provide challenging texts and foster comprehension processes than nonacademic schools (Becker et al., 2012; Carver & Leibert, 1995; Pfost, Dörfler, & Artelt, 2010). As immigrant students are less likely to attend academic track schools and are instead largely concentrated in nonacademic track schools compared to their native peers in Germany (Autorengruppe Bildungsberichterstattung, 2010), students' immigration status may confound with the types of school track. Thus, it may be necessary to separate the effects of school tracks from the effects of differences in the students' immigration background on the relation between intrinsic reading motivation and reading competence.

Furthermore, immigrant students often use not only the language of instruction but also the language of origin outside of school. However, questionnaires often used for measuring intrinsic motivation in large scale-assessment studies such as the PISA studies are not language-specific. In other words, it is unknown whether immigrant students rate their intrinsic motivation and reading amount with reference to the language of origin or to the language of instruction. It is plausible to assume that when students rate their intrinsic motivation with reference to a non-German language, the effect of intrinsic motivation on German language competence may not be substantial. Thus, it is important to take into account the language use for reading while disentangling the motivation-achievement paradox of immigrant students.

Finally, immigrants in Germany come from diverse backgrounds in terms of language, culture, and migration history. Previous research also shows that there seems to be some ethnic differences in the level of reading achievement as well as intrinsic motivation. While ninth-grade second-generation students of Turkish origin achieve significantly lower scores in reading than the majority, this is not the case for second-generation migrants from Poland and the FSU (Stanat, Rauch, & Segeritz, 2010). Moreover, Thijs (2011) observed higher intrinsic motivation for Turkish and Moroccan students than native Dutch students. Pat-El, Tilenma, and van Koppen (2012) also indicated that intrinsic motivation was the highest for Turkish, followed by Moroccan, then native Dutch students. Finally, Fuligni (1997) observed the highest intrinsic motivation (i.e., values in English, math, and academic success) for Asians, followed by Filipino, Latino, and Caucasian students in the United States. Taken together, it is worthwhile to take into account the ethnic heterogeneity of the immigrant population for this topic.

3. Research questions

The goal of this dissertation is to disentangle the motivation-achievement paradox and to provide a theoretical and empirical explanation for the paradox. In order to achieve this goal, I aim to answer following four research questions.

1. *Is the construct of intrinsic motivation measurement invariant between native and immigrant students?*

I hypothesize that intrinsic motivation is measurement invariant between native and immigrant students (H1) as there seems to be lack of theoretical or empirical evidence to assume conceptual differences in the construct between native and immigrant students. In addition, it is important to confirm the measurement invariance as it is a precondition for statistically comparing the strength of the relationship between intrinsic motivation and reading competence for native and immigrant students.

2. *Is the directionality of the relationship between intrinsic motivation and reading competence reciprocal?*

Based on previous research (e.g., Mogan & Fuchs, 2007), I hypothesize that intrinsic motivation and reading competence should be reciprocally and positively related to each other (H2). In other words, students who enjoy reading should become more competent in reading, while competence readers are expected to become more interested in reading.

3. *Is the relationship between intrinsic motivation and reading competence mediated by reading amount and metacognitive knowledge of strategy use?*

In line with previous literature (e.g., Schiefele et al., 2012), I hypothesize that the amount of reading and metacognitive knowledge of reading strategy use will positively and significantly mediate the relationship between intrinsic motivation and reading competence (H3). More specifically, intrinsic motivation will positively predict reading amount and metacognitive knowledge of strategy use, which in turn will positively predict reading competence. I also expect to see significant positive indirect effects of intrinsic motivation on reading competence through reading amount and metacognitive knowledge of strategy use. This means that intrinsically motivated readers should improve their reading competence as they spend more time reading and engage in more extensive use of comprehension strategies.

4. *Does the destination language exposure account for the weaker link between intrinsic motivation and reading achievement for immigrant students compared to native students?*

In line with the argument presented earlier, I hypothesize that there will be significant

and positive interaction effects between intrinsic motivation and destination language exposure on reading competence (H4). More specifically, I expect that students with high destination language exposure will show a stronger link between intrinsic motivation and reading competence than those with low exposure, indicating that students with high exposure benefit more from their high intrinsic motivation for their reading achievement compared to those with low exposure.

4. Results

In this section, I summarize the results of the three empirical studies that I have conducted for this dissertation. Study 1 investigated the directionality of the relationship between intrinsic motivation and reading achievement for native and immigrant students (section 4.1.). Study 2 examined the mediating processes of how intrinsic motivation is transformed into reading achievement through the amount of reading and knowledge of strategy use, as well as the generalization of the processes to the students with an immigration background (section 4.2.). Study 3 investigated the role of destination language exposure as a key to account for the observed ethnic differences in the relationship between intrinsic motivation and reading competence (section 4.3.).

4.1. Study 1: Reciprocal relations between intrinsic reading motivation and reading competence: A comparison between native and immigrant students in Germany (Appendix 1)

The purpose of this study was to examine the directionality of the relationship between intrinsic motivation and reading competence for students with and without an immigration background. Within the framework of the National Educational Panel Study (NEPS), a total of 4,619 secondary school students (Grades 5 to 7) in Germany were included in the analyses. First, the measurement invariance of intrinsic motivation was conducted between native and immigrant students. Intrinsic motivation was measured in Grades 5 and 7 with five items based on the Habitual Reading Motivation Questionnaire (Möller & Bonerad, 2007), a German adaptation of the Motivation for Reading Questionnaire (MRQ). The example items include "I enjoy reading books.", and "I think that reading is interesting." Reliabilities of the scale was good (> .86) at both Grades 5 and 7 for both native and immigrant students. The results supported the confugural and metric measurement invariance of the construct, suggesting that the general factor structure as well as the factor loadings of intrinsic motivation in Grades 5 and 7 are considered to be similar for native and immigrant students.

Second, the directionality of the relationship between intrinsic motivation and reading competence was examined for students with and without an immigration background. The results showed that for native students, there were reciprocal cross-lagged effects of intrinsic motivation and reading competence from Grades 5 to 7. Intrinsic motivation in Grade 5 significantly and positively predicted reading competence in Grade 7. At the same time, reading competence in Grade 5 significantly and positively predicted intrinsic motivation in Grade 7. In comparison, for immigrant

students, there was no reciprocal cross-lagged effect between intrinsic motivation and reading competence. Although there was a positive and significant cross-lagged effect of reading competence in Grade 5 on intrinsic motivation in Grade 7, there was no significant cross-lagged effect of intrinsic motivation in Grade 5 on reading competence in Grade 7.

Furthermore, in order to separate the effects of school tracks which may be confounded with students' immigration status, the study compared the relationship between intrinsic motivation and reading competence among the following four groups 1) native students in nonacademic track schools, 2) immigrant students in nonacademic track schools, 3) native students in academic track schools, and 4) immigrant students in academic track schools. The results showed that students' school tracks did not confound with students' immigration status with regard to the directionality of the relationship between intrinsic motivation and reading competence. Regardless of which school tracks students belong to, for native students, there were significant and positive reciprocal cross-lagged effects of intrinsic motivation and reading competence, while for immigrant students, although there was a significant and positive cross-lagged effect of reading competence on intrinsic motivation, there was no significant reverse cross-lagged effect.

Finally, because the questionnaires used to measure intrinsic motivation were not language-specific, it is difficult to tell whether immigrant students rate their intrinsic motivation with reference to the language of origin (non-German languages) or to the language of instruction (German). In order to find this out, the study looked into the item of the language use for reading books. In fact, the majority of students who learned a non-German language as a family language in their childhood (88.2%) indicated that they use only or mostly German for reading books. Thus, there may be high chances that these students rated their intrinsic motivation based on German. Nevertheless, in order to investigate the effect of the language use for reading on the relationships among intrinsic motivation, reading amount, and reading competence, supplementary analyses were conducted for students who read only or mostly in German and students who read only and mostly in other languages. The results showed that within the group of students who read only or mostly in German, intrinsic motivation significantly and positively predicted reading amount, which in turn significantly and positively predicted reading competence while controlling for previous reading competence. However, within a group of students who read only or mostly in non-German languages, intrinsic motivation did not significantly predict reading amount, and reading amount also did

not significantly predict reading competence while controlling for previous reading competence.

4.2. Study 2: The relation between intrinsic motivation and reading competence: Mediating roles of metacognitive knowledge of strategy use and reading amount (Appendix 2)

The goal of this study was to investigate the mediating effects of reading amount and metacognitive knowledge of strategy use on the relation between intrinsic motivation and reading competence while controlling for previous reading competence and educational levels of parents from Grades 5 to 7. In addition, the study also examined whether those mediating effects can be generalized to the group of immigrant students. Within the framework of the German National Educational Panel Study (NEPS), a total of 3,829 secondary school students were included in the analyses. According to the results, the relationship between intrinsic motivation in Grade 5 and reading competence in Grade 7 was significantly and positively mediated by reading amount and metacognitive knowledge of strategy use in Grade 6 while controlling for reading competence in Grade 5 and educational levels of parents. More specifically, intrinsic motivation in Grade 5 significantly and positively predicted reading amount and metacognitive knowledge of strategy use in Grade 6, which in turn significantly and positively predicted reading competence in Grade 7. There were also significant and positive indirect effects of intrinsic motivation in Grade 5 on reading competence in Grade 7 via reading amount and metacognitive knowledge of strategy use in Grade 6. Importantly, these mediating effects were replicated for the students with an immigration background, suggesting that the mediating processes of how intrinsic motivation transformed into reading achievement can be generalized to students with an immigration background.

4.3. Study 3: Immigrant students' achievements in light of their educational aspirations and academic motivation (Appendix 3)

The aim of this study was to investigate the role of exposure to the destination language as a key to account for the observed ethnic differences in the relation between intrinsic motivation and reading competence while controlling for the effects of various factors such as cognitive ability, school types, gender, age, educational levels of parents, occupational status of parents, and cultural capital. Within the framework of the German National Educational Panel Study (NEPS), a total of 14,981 ninth grade secondary

school students were included in the analyses. The results showed that the relationship between intrinsic motivation (measured with interest in German-subject) and reading achievement was substantially weaker for students with an immigration background (students of Turkish and FSU origins) compared to the majority students. Furthermore, there were significant positive interaction effects between destination language use and intrinsic motivation on reading achievement. More specifically, students who had high exposure to the destination language showed stronger relationship between intrinsic motivation and reading achievement compared to students with lower exposure to the destination language. Moreover, after including the multiplicative effects of exposure to the destination language and intrinsic motivation in the OLS regression model, the initially weaker link between intrinsic motivation and reading achievement observed for students of Turkish and FSU origins compared to students with Polish background was considerably reduced, and the remaining differences became no longer statistically significant. In other words, the observed differences in the link between intrinsic motivation and reading achievement across ethnic groups were partially explained by the differences in the amount of exposure to the destination language in daily interactions.

5. Discussion

In this section, findings on the three empirical studies I have conducted are discussed (Section 5.1.). Following that, some practical implications for future research, schools, and teachers based on my findings are discused (Section 5.2.).

5.1. Disentangling the motivation-achievement paradox

Before investigating the explanation for the weaker relationship between intrinsic motivation and reading competence for immigrant students than for native students, three matters were examined: a) measurement invariance of intrinsic motivation between native and immigrant students, b) directionality of the relation between intrinsic motivation and reading competence, and c) mediating processes of how intrinsic motivation transforms into reading achievement. In line with H1, the results of Study 1 confirm the (configural and metric) measurement invariance of intrinsic motivation between native and immigrant students, which is a necessary condition for comparing the strength of the relationship between intrinsic motivation and reading competence across these groups. The measurement invariance of intrinsic motivation between native and immigrant students also supports the conceptual similarity of the construct between groups. In other words, native and immigrant students seem to have similar interpretations of the items measuring intrinsic motivation.

Furthermore, in line with H2, the results of Study 1 provide strong empirical support for the reciprocal relationship between intrinsic motivation and reading achievement for students without an immigration background. The result suggests that higher intrinsic motivation tends to lead to an increased reading competence, while greater reading competence also tends to foster intrinsic motivation. This is consistent with the findings of McElvany et al. (2008) and Schiefele et al. (2016), who also confirmed reciprocal effects between intrinsic motivation and reading competence. However, inconsistent with H2, within the immigrant sample, the relationship between intrinsic motivation and reading competence was not found to be bidirectional. Although there was a positive and significant effect of earlier reading competence on later intrinsic motivation, initial intrinsic motivation did not significantly predict subsequent reading competence for this group. This finding indicates that, for immigrant students, higher reading competence may facilitate intrinsic motivation while promoting intrinsic motivation may not substantially contribute to the improvement of reading competence.

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Consistent with H3, the results of Study 2 provide strong evidence for the mediating roles of reading amount and metacognitive knowledge of strategy use in the relationship between intrinsic motivation and reading competence. Importantly, these mediating effects were also found for students with an immigration background, indicating that the mediating processes of how intrinsic motivation transforms into reading achievement can be generalized to students with an immigration background. This finding suggests that intrinsically motivated students tend to improve their reading competence by spending more time on reading activities and using more effective strategies compared to their counterparts. In addition, immigrant students do not seem to differ from native students in the mechanisms of how they transform intrinsic motivation into reading achievement.

As expected with H4, the results of Study 3 confirm a significant positive interaction effect between intrinsic motivation and exposure to the destination language on reading achievement, while also taking into account cognitive ability, gender, age, and educational levels as well as socio-economic background of parents. This result suggests that the more immigrant students are exposed to the destination language at home, the more successful they seem to turn intrinsic motivation into reading achievement. In addition, the initially weaker link between intrinsic motivation and reading achievement for Turkish and FSU students compared to Polish students became no longer significant after including the interaction effect between intrinsic motivation and exposure to the destination language in the model. This finding indicates that the observed ethnic differences in the relationship between intrinsic motivation and reading achievement, at least partly, can be attributed to the differences in the amount of destination language exposure. This could imply that the motivation-achievement paradox of immigrant students may be partially explained by their limited opportunities to use the destination language outside school.

Additionally, in order to better understand the motivation-achievement paradox, several relevant factors were taken into account such as types of school tracks, language use for reading, and ethnic heterogeneity of immigration backgrounds. The results of Study 1 imply that the effects of school tracks do not seem to confound with the effects of differences in the students' immigration status on the relation between intrinsic motivation and reading competence. In other words, the weaker link between intrinsic motivation and reading competence for immigrant students compared to their native peers seems to be true regardless of school tracks. Independent of which school tracks immigrant students attend to, they seem to struggle more with successfully translating

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their intrinsic motivation into reading achievement compared to their native peers.

Moreover, the supplementary analyses of Study 1 reveal that the relationship between intrinsic motivation and reading competence seems to be significantly weaker for students who read books in the language of origin than for students who read books in the language of instruction. In fact, when students read in the language of origin, neither intrinsic motivation nor the amount of reading seems to be relevant for improving reading competence. This finding is in line with the argument that opportunities to utilize the language of instruction (i.e., reading books in the language of instruction) seems to be a key to account for the weaker effect of intrinsic motivation on reading competence for immigrant students than for native students.

Finally, in order to take into account the ethnic heterogeneity of the immigrant sample, Study 3 differentiated three largest immigrant groups in Germany (students from families of Turkish, Polish, and the former Soviet Union origin) and compared them to their native peers with regard to the relationship between intrinsic motivation and reading achievement. The findings reveal that although the weaker effect of intrinsic motivation on reading competence compared to the native majority was observed for students from Turkish origin and former Soviet Union origin, it was not observed for students from Polish origin. Thus, the motivation-achievement paradox seems to exist for Turkish and former Soviet Union students, but not for Polish students. As Polish students tend to be more exposed to the destination language at home, they seem to be better at successfully turning their intrinsic motivation into achievement compared to students from Turkish or former Soviet Union origin. Ethnic groups seem to vary in the amount of exposure to the destination language in daily interactions. These findings may imply that ethnic groups that are restricted with their opportunities to communicate in the destination language may be especially at risk of experiencing the motivation-achievement paradox.

5.2. Implications for future research, schools and teachers

This dissertation has several important theoretical and empirical contributions and implications for future research. First, this dissertation was among the first to disentangle the motivation-achievement paradox, by providing a clear understanding of the phenomenon. Based on the present findings, I suggest future researchers to address the motivation-achievement paradox as "the weaker relationship between intrinsic motivation and reading competence for immigrant students compared to their native peers" instead of "higher intrinsic motivation despite lower reading achievement for

immigrant students compared to their native peers". The former definition is more accurate and comprehensive than the latter as it reflects the challenges often faced by immigrant students that they have more difficulties turning their intrinsic motivation into their reading achievement compared to their native peers.

Moreover, this dissertation has substantial contributions to the theoretical understanding of the causal directionality of the relation between intrinsic motivation and reading achievement. The findings of Study 1 suggest that different theoretical models of the relationship between intrinsic motivation and reading achievement may be applicable to native and immigrant students. While the reciprocal effects model may be most likely for native students, the skill development model seems to be most applicable for immigrant students. The effect of initial intrinsic motivation on later reading competence seems to be as large as the effect of earlier reading competence on later intrinsic motivation within the native sample. In contrast, the effect of earlier intrinsic motivation on later reading competence seems to be less pronounced than the reverse effect for immigrant students. In other words, intrinsic motivation seems to act as a precursor as well as a consequence of reading achievement for native students, whereas it tends to act more as a consequence than a precursor of reading achievement for immigrant students. This finding implies that intrinsic motivation may have a less important role in the development of reading competence for immigrant students than for native students because of the different causal mechanisms of the relation between intrinsic motivation and reading competence for native and immigrant students. This finding is relevant especially when addressing the motivation-achievement paradox because the weaker relation between intrinsic motivation and reading achievement seems to exist only when motivation is considered as a precursor and not when it is considered as a consequence of reading achievement. Hence, future research on this topic should take the directionality of the relation between intrinsic motivation and reading achievement into account.

In terms of practical implications of this dissertation to schools and teachers, increasing the opportunities to read and interact in the destination language outside classrooms is inevitable for immigrant students to take advantage of their intrinsic motivation to strengthen their reading competence. In order to increase such opportunities, teachers may accompany students to a library and encourage them to find books which they find interesting. Schools may also assign students to read books of their choice and talk about what they have read with their peers outside classrooms or with parents at home. Moreover, the effective use of strategies is important for students

to successfully translate their intrinsic motivation into reading achievement. In order to facilitate understanding of text, it is necessary to know not only "which" strategies to use, but also "when" and "how" to use those strategies (e.g., Artelt, 2000). Even when students know about various comprehension strategies, if they do not know when and how to apply those strategies, they may not be able to improve their understanding of text. As immigrant students seem to have significantly lower metacognitive knowledge of strategy use compared to their native peers, it may be relevant for teachers to demonstrate sufficient examples of reading situations where immigrant students often struggle with and provide enough guidance for them to learn and master the applications of strategies. These implications of the findings may be particularly important in order to reduce the reading achievement gap between native and immigrant students in the future.

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Appendix

List of original contributions

1. Miyamoto, A., Pfost, M., & Artelt, C. (2018). Reciprocal relations between intrinsic reading motivation and reading competence: A comparison between native and immigrant students in Germany. *Journal of Research in Reading*, *41*, 176–196. doi: 10.1111/1467-9817.12113

2. Miyamoto, A., Pfost, M., & Artelt, C. (revised and resubmitted). The relation between intrinsic motivation and reading competence: Mediating roles of metacognitive knowledge of strategy use and reading amount.

3. Miyamoto, A., Seuring, J., & Kristen, C. (submitted). Immigrant students' achievements in light of their educational aspirations and academic motivation.

1. **Reciprocal Relations between Intrinsic Reading Motivation and Reading Competence: A Comparison between Native and Immigrant Students in Germany**

Ai Miyamoto, Maximilian Pfost, & Cordula Artelt

Abstract. The present study compares native and immigrant students regarding the direction and the strength of the relation between intrinsic reading motivation and reading competence. Within the framework of the German National Educational Panel Study, 4,619 secondary school students were included in the analyses. The present study confirmed the reciprocal cross-lagged effects between intrinsic reading motivation and reading competence from grades 5 to 7 for native students. In addition, the effect of grade 5 intrinsic reading motivation on grade 7 reading competence was mediated by grade 6 reading amount. However, for immigrant students, although the cross-lagged effect of grade 5 reading competence on grade 7 intrinsic reading motivation was significant, the reverse effect was not significant. The present findings suggest that intrinsic reading motivation seems to be essential for the development of reading achievement for native students whereas it seems to be of less importance for immigrant students.

1. Introduction

Reading motivation has been defined as "the individual's personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading" (Guthrie & Wigfield, 2000, p.405). Reading motivation is suggested to be a multidimensional construct which is composed of different aspects including intrinsic and extrinsic reading motivation (Wigfield, 1997). *Intrinsic reading motivation* is defined as individuals' disposition to read because the process of reading is rewarding and satisfying in itself (Schiefele, Schaffner, Möller, & Wigfield, 2012). In comparison, *extrinsic reading motivation* is created when individuals read for incentives that are external to the reading activity such as reading for recognition or grades (Schiefele et al., 2012). Extrinsic reading motivation also contains instrumental motives for reading such as influences from parents, schools, or peers (Becker, McElvany, & Kortenbruck, 2010).

Previous research has consistently shown that students' intrinsic reading motivation is positively related to reading competence. This is found to be true even after taking into account students' reasoning ability, decoding speed, prior reading achievement, gender, and family background (Andreassen & Bråten, 2010; Guthrie et al., 2007; Retelsdorf, Köller, & Möller, 2011; Schaffner, Philipp, & Schiefele, 2014; Wang & Guthrie, 2004). Despite strong empirical evidence for the positive association between intrinsic reading motivation and reading competence, most of the evidence is based on correlational studies. Thus, the causal direction of the relation between intrinsic reading motivation and reading competence still remains a topic of discussion.

Moreover, previous studies have consistently shown that immigrant students tend to underachieve compared to native students in reading in Germany (Kigel, McElvany, & Becker, 2015; Stanat & Christensen, 2006). Thus, it is highly relevant for current research to better understand the nature of the relation between intrinsic reading motivation and reading competence especially for immigrant students. Taken together, the purpose of the present study is to investigate the relation between intrinsic reading motivation and reading competence from a longitudinal perspective in a sample of native and immigrant students in Germany.

1.1. The direction of the relation between intrinsic reading motivation and reading competence

Previous research suggests three theoretical models for the direction of the relation between intrinsic reading motivation and reading competence: the self-enhancement model, the skill-development model, and the reciprocal effects model

(Calsyn & Kenny, 1977; Guay, Marsh, & Boivin, 2003). The self-enhancement model suggests that intrinsic reading motivation is a precursor of reading competence. Intrinsically motivated readers tend to improve their reading competence by spending more time on reading, using more complex reading strategies, and preferring to read more challenging texts (Schiefele et al., 2012).

Empirical support for the self-enhancement model is provided by Guthrie et al. (2007) who investigated reciprocal effects between intrinsic reading motivation and reading competence over a three months period in a sample of fourth grade students. They found a significant effect of indicators of intrinsic reading motivation (interest in reading, preference for choice, and involvement) on reading competence growth, but they did not obtain a significant effect of reading competence on growth in reading motivation. Moreover, Retelsdorf et al. (2011) found that indicators of intrinsic reading motivation (particularly reading for interest) significantly predicted reading comprehension growth from grades 5 to 8 even after controlling for cognitive skills, family characteristics, and demographic variables. However, Retelsdorf et al. (2011) did not examine the reverse effects of reading comprehension on reading motivation.

In contrast to the self-enhancement model, the skill-development model (Calsyn & Kenny, 1977; Guay et al., 2003) indicates that intrinsic reading motivation is a consequence of reading competence. Students with better reading skills may experience more positive emotions while reading (e.g. enjoyment) due to better understanding of a text, and this could increase their intrinsic reading motivation. In contrast, students with poor reading skills may feel more negative emotions (e.g. frustration), and this could decrease their intrinsic reading motivation.

The skill development model is supported by Becker et al. (2010) who showed that although grade 3 reading competence significantly predicted grade 4 intrinsic reading motivation, grade 4 intrinsic reading motivation did not significantly contribute to grade 6 reading competence. However, Becker et al. (2010) also mentioned that due to the high stability of reading competence from grades 3 to 6 in their study, it cannot be strictly concluded that intrinsic reading motivation has no effect on reading competence.

Finally, in order to reconcile the self-enhancement model with the skill-development model, the reciprocal effects model (Guay et al., 2003) proposes that intrinsic reading motivation is an antecedent as well as a result of reading competence. Although from a theoretical and empirical perspective, the reciprocal-effects model seems to be the most convincing (Morgan & Fuchs, 2007), only a few longitudinal studies (McElvany, Kortenbruck, & Becker, 2008; Schaffner et al., 2014; Schiefele,

Stutz, & Schaffner, 2016) have provided empirical support for this model.

In a sample of second and third graders, Schiefele et al. (2016) observed reciprocal cross-lagged effects between an indicator of intrinsic reading motivation (reading involvement) and reading comprehension at the word and sentence levels. However, although the cross-lagged effect of reading comprehension at the passage level on intrinsic reading motivation was significant, the reverse cross-lagged effect was not found to be significant. McElvany et al. (2008) also observed reciprocal cross-lagged effects between intrinsic reading motivation and reading comprehension from grades 3 to 4. However, from grades 4 to 6, they obtained neither a significant effect of intrinsic reading motivation on reading competence nor a significant effect of reading competence on intrinsic reading motivation. Furthermore, McElvany, Becker, and Lüdtke (2009), who analyzed the same data set as McElvany et al. (2008), also did not find a significant effect of grade 4 intrinsic reading motivation on grade 6 reading comprehension even after accounting for vocabulary, reading amount, and various family background characteristics. Finally, Schaffner et al. (2014) observed reciprocal effects between intrinsic reading motivation and reading competence from grades 5 to 6 for students from academic track schools, but not for students from nonacademic track schools.

1.2. Reading amount as a mediator

In order to investigate the direction of the relation between intrinsic reading motivation and reading competence, it is also important to consider possible mediating processes of this relation. *Reading amount*, often measured by frequencies of reading, is found to explain the effect of intrinsic reading motivation on reading competence (Schaffner, Schiefele, & Ulferts, 2013; Stutz, Schaffner, & Schiefele, 2016). The mechanism of how intrinsically motivated students tend to improve their reading comprehension through an increased amount of reading involves the following steps. First, intrinsically motivated readers tend to genuinely enjoy reading because it is rewarding and satisfying in itself (Schiefele et al., 2012). Secondly, readers' positive emotions experienced during the reading processes may reinforce them to seek more reading activities in the future. This assumption is also empirically confirmed that readers with higher intrinsic reading motivation tend to read more often than readers with lower intrinsic reading motivation (Guthrie, Wigfield, Metsala, & Cox, 1999; Wigfield & Guthrie, 1997). Finally, students who spend more time on reading for pleasure tend to become more competent readers (Pfost, Dörfler, & Artelt, 2010). This

may be due to an increase in readers' prior knowledge of text topics which is found to be a strong predictor of reading competence (Artelt, Schiefele, & Schneider, 2001; Guthrie et al., 1999), or because of the automatization of basic reading skills (e.g. decoding speed, comprehension strategies, and metacognition) that are also shown to facilitate reading comprehension (Andreassen & Bråten, 2010; Artelt et al., 2001).

However, previous studies which have examined the mediating role of reading amount seem to show inconsistent results. In a sample of elementary school children (grades 2 to 5), some studies have found mediation effects of reading amount on the relation between intrinsic reading motivation and reading comprehension (Schaffner et al., 2013; Stutz et al., 2016) while others have not (De Naeghel, Van Keer, Vansteenkiste, & Rosseel, 2012; Wang & Guthrie, 2004). In these studies, although intrinsic reading motivation was related to reading amount, the reading amount did not significantly contribute to reading competence (De Naeghel et al., 2012; Wang & Guthrie, 2004).

Until this time, only a few longitudinal studies (Becker et al., 2010; McElvany et al., 2008; Schaffner & Schiefele, 2016) have examined indirect effects of intrinsic reading motivation on reading competence through reading amount. Schaffner and Schiefele (2016) investigated effects of intrinsic reading motivation on the word and sentence level comprehension before and after six-weeks of summer vacation in a sample of third graders. Their results revealed that the effect of intrinsic reading motivation on the post-vacation reading comprehension was mediated by reading amount when controlling for the pre-vacation reading comprehension.

McElvany et al. (2008) investigated mutual relations among intrinsic reading motivation, reading amount, and reading comprehension from grades 3 to 6. They found a significant but small indirect effect of grade 3 intrinsic reading motivation on grade 6 reading comprehension through grade 4 reading amount ($\beta = .02$, $p < .05$). Using the same data set as McElvany et al. (2008), Becker et al. (2010) also observed a significant indirect effect of grade 4 intrinsic reading motivation on grade 6 reading comprehension through grade 4 reading amount. However, this indirect effect disappeared when extrinsic reading motivation and grade 3 reading achievement were added to the model. Although grade 4 intrinsic reading motivation positively and substantially predicted grade 4 reading amount, this reading amount did not significantly contribute to grade 6 reading competence.

The results of Becker et al. (2010) may differ from that of McElvany et al. (2008) possibly because of the inclusion of extrinsic reading motivation and the different measures used for intrinsic reading motivation and reading competence. In

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addition, although McElvany et al. (2008) included all relevant variables in grades 3, 4, and 6, Becker et al. (2010) included intrinsic reading motivation and reading amount only in grade 4 and reading competence in grades 3 and 6.

Theoretically, it is plausible to assume that intrinsically motivated students tend to read more often, and their frequent reading behaviour leads to better reading competence. However, as reviewed above, the previous studies seem to show mixed results. These inconsistent results may be due to the mostly cross-sectional nature of the studies. Moreover, the introduction of potential moderators might help clarify these inconsistent relationships.

1.3. The role of students' immigration background as a moderator

In spite of the strong empirical support for the relation between intrinsic reading motivation and reading competence, a moderating role of various students' background variables on this relation is not well understood (Schaffner et al., 2014). Specifically, in Germany, students' immigration background seems to play an important role in predicting their reading competence as immigrant students tend to show significantly lower reading achievement than their native peers (Kigel et al., 2015; Stanat & Christensen, 2006).

According to the PISA framework (OECD, 2010), 15-year-old immigrant students lag more than 50 score points on average in reading achievement behind native students in Germany. Such native-immigrant achievement gap in Germany can be largely explained by socio-economic status, educational levels of parents, and languages spoken at home (Marx & Stanat, 2012). However, even when controlling for socio-economic status and cultural capital, the negative effect of students' immigration status on text comprehension and vocabulary was found to remain significant (Kigel et al., 2015).

Despite lower reading achievement, immigrant students in Germany tend to have similar or even higher intrinsic reading motivation than native students. Kigel et al. (2015) showed that native and immigrant students did not significantly differ in the levels of intrinsic reading motivation. In addition, students' immigration status positively predicted intrinsic reading motivation in grades 4 and 6 while taking into account prior motivation, vocabulary, and text comprehension. Moreover, Villiger, Wandeler, and Niggli (2014) found that students' immigration status was either uncorrelated or positively correlated with indicators of intrinsic reading motivation (reading enjoyment and reading curiosity) in a sample of German speaking students in

Switzerland.

Immigrant students' similar or even higher levels of motivation despite their lower achievement in comparison to native students, sometimes called the aspiration-achievement paradox (Salikutluk, 2016), can be explained by *the immigrant optimism hypothesis* (Kao & Tienda, 1995). In line with this hypothesis, immigrants often move to other countries with the aim of socio-economic improvement, and they seem to perceive their child education as the key to their upward mobility. For instance, parents of Turkish origin in Germany reported that they wish their children to obtain opportunities for better future outcomes through attaining higher educational qualifications (Relikowski, Yilmaz, & Blossfeld, 2012). Compared to native parents, immigrant parents tend to possess significantly higher educational expectations for their children. Higher parental educational expectations often go along with children's positive learning attitudes such as high levels of reading motivation (Villiger et al., 2014).

Although many studies have examined differences in reading motivation and reading achievement at mean-levels, no studies to authors' knowledge so far have directly examined the differences in the relation of these variables between native and immigrant students in a German context. However, it is highly relevant for current research to draw attention to students' immigration background when examining the relation between intrinsic reading motivation and reading competence due to its high practical relevance for curricula aiming to strengthen reading skills of immigrant students.

1.4. The present study

The present study intends to answer the following research questions: 1) Do intrinsic reading motivation and reading competence have reciprocal effects on each other? 2) Is the effect of intrinsic reading motivation on reading competence mediated by reading amount? 3) Do native and immigrant students differ in the direction and the strength of the relation between intrinsic reading motivation and reading competence? As a reciprocal relation between intrinsic reading motivation and reading competence is most likely (Morgan & Fuchs, 2007), we hypothesized that intrinsic reading motivation and reading competence will significantly predict each other from grades 5 to 7. In addition, consistent with previous research (e.g. Stutz et al., 2016), we also hypothesized that the effect of grade 5 intrinsic reading motivation on grade 7 reading competence will be significantly mediated by grade 6 reading amount.

Furthermore, we expect significant and positive reciprocal effects between intrinsic reading motivation and reading competence for both native and immigrant students. We also expect a significant positive indirect effect of intrinsic reading motivation on reading competence through reading amount for both native and immigrant students. This is due to the assumption that the psychological and behavioural mechanisms of how intrinsic reading motivation and reading competence influence each other should not be different for native and immigrant students.

The present study also takes into account the *types of school track* as a control variable. In Germany, school tracks can be largely divided into either an academic track which typically prepares students for higher education, or a nonacademic track which emphasizes more on practical education and vocational training. 34.2% of secondary school students in Germany enroll in academic track schools whereas the remaining students attend nonacademic track schools (Statistisches Bundesamt, 2016).

In previous research, school tracks have been found to moderate the relation between intrinsic reading motivation and reading competence. Schaffner et al. (2014) investigated the influence of different track schools on the reciprocal relations between intrinsic reading motivation and reading competence from grades 5 to 6. Their results revealed that significant reciprocal relations between intrinsic reading motivation and reading competence were observed only for academic track students. Neither intrinsic reading motivation nor reading competence significantly predicted each other for nonacademic track students. Hence, it is crucial to consider the possibility that the strength of relations between intrinsic reading motivation and reading competence may significantly differ between different school tracks. As immigrant students are less likely to attend academic track schools and are instead largely concentrated in nonacademic track schools compared to their native peers in Germany (Autorengruppe Bildungsberichterstattung, 2010), students' immigration status may confound with the types of school track. Thus, it is necessary to separate the effect of school tracks from the effect of students' immigration background on the relation between intrinsic reading motivation and reading competence.

2. Method

2.1. Data and sample

The analyses of the present study used data from the German National Educational Panel Study (NEPS), Starting Cohort Grade 5[1]. The NEPS is a framework with a multi-cohort longitudinal design, and their goal is to examine educational

processes and outcomes in different developmental stages of a life course (Blossfeld, Roßbach, & von Maurice, 2011). The sampling procedure of the participants includes the following steps. First, regular schools at lower secondary level were randomly sampled. Then, grade 5 classes within the selected schools were randomly chosen. Finally, two classes were selected per school, and all students of selected classes were invited to participate in the study. This sampling procedure ensured that the sample is representative of secondary regular school children in Germany.

Participants were asked to fill out the questionnaires and take various competence tests. The main sample of students (n = 4,619) were tested at three time points: in the beginning of grade 5 in 2010 (T1), in the beginning of grade 6 in 2011 (T2), and in the beginning of grade 7 in 2012 (T3). At T3, in addition to the main sample, more than 2,000 participants were newly recruited to participate in the study as a refreshment sample. However, this sample was not included in our analyses as students in this sample did not participate in the study at T1 and T2. The average age of the main sample was M = 10.50 (SD = .62) years at T1, M = 11.48 (SD = .60) years at T2, and M = 12.59 (SD = .67) years at T3. Males were slightly over represented within our sample (51.6%)

Students' immigration background was defined based on the birthplaces of students and their parents. Students were asked to indicate their own and their parents' countries of birth. The countries of birth were then coded as either Germany or other countries. When a student was born in Germany and he/she has at least one parent who was also born in Germany, he/she was categorized as native students (coded as 0). When a student was born outside of Germany (first generation immigrants), he/she was grouped as immigrant students (coded as 1). When a student was born in Germany but both of his/her parents were born outside of Germany (second generation immigrants), he/she was also grouped as immigrant students (coded as 1).

We considered first and second generation students as immigrant students because previous research including the PISA framework (e.g. OECD, 2010) consistently suggests that these groups of students seem to be significantly disadvantaged in reading achievement compared to students of native-born parents. Thus, it was important to draw attention to these groups of students in our study. In total, our analyses focused on data of 3,907 native students and 712 immigrant students. In our sample, immigrant students tend to have lower educated parents than native students as immigrant parents had shorter education years (M = 12.27, SD = 2.53) than native parents (M = 14.19, SD = 2.22). 46.3% of immigrant students spoke only or mostly

non-German languages at home.

2.2. Instruments

2.2.1. Intrinsic reading motivation

Intrinsic reading motivation was measured with five items taken from the reading enjoyment and reading for interest subscales of the Habitual Reading Motivation Questionnaire (Möller & Bonerad, 2007), a German adaptation of the Motivation for Reading Questionnaire (MRQ). The selection of these items was based on the decisions of experts in the NEPS core team. In the selection processes, the experts aimed to cover the breadth of the construct by eliminating the items which share similar aspects. Some items were also removed if they were location-specific (e.g. at school or at home) in order to address the construct in a general context. Furthermore, to measure the construct across a wide range of age groups, the length and the linguistic level of the items were also taken into account.

The selected items include the following statements: 1) 'I enjoy reading books', 2) 'I think that reading is interesting', 3) 'I like reading about new things', 4) 'I am convinced that I can learn a lot by reading', and 5) 'Reading is important to understand things right'. All items were answered on a four-point rating scale from 1 (*do not agree at all*) to 4 (*completely agree)*. The higher scores indicated higher intrinsic reading motivation. One item ('If I had enough time, I would read even more') was removed from the scale as it may confound with the measure of reading amount. Intrinsic reading motivation was measured at T1 (grade 5) and at T3 (grade 7). Reliabilities of the scale was good for native students ($\omega = .86$, $\alpha = .88$ at T1; $\omega = .88$, $\alpha = .89$ at T3) and for immigrant students ($\omega = .87$, $\alpha = .89$ at T1; $\omega = .88$, $\alpha = .90$ at T3).

2.2.2. Reading competence

The reading comprehension test administered in the NEPS is intended to measure the functional understanding of written texts in a typical everyday situation. This concept of reading competence is also in line with the reading literacy concept of the PISA framework, that is, "the capacity to understand, use and reflect on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society" (OECD, 2002). Various text comprehension theories (e.g. Kintsch, 1998) were taken into account by the NEPS framework for assessing reading comprehension (see Gehrer, Zimmermann, Artelt, & Weinert, 2013, for more information on theoretical considerations for the test). The NEPS also meets the demand

for constructing a reading competence test that measures the same construct across all age groups (Gehrer et al., 2013).

The measurement invariance was checked across various subgroups (e.g. gender, socioeconomic status, and immigration background) in order to make sure that the test captures the same construct regardless of students' various demographic characteristics. First, differential item functioning (DIF) was calculated based on a multi-group IRT model, in which main effects of the subgroups and differential effects of the subgroups on item difficulty were estimated. Following this, the differences in the estimated item difficulties between the subgroups were assessed. Finally, the model fit was examined by comparing the models with and without the DIF (Pohl, Haberkorn, Hardt, & Wiegand, 2012).

The test consisted of five types of continuous texts with approximately 200 to 550 words each (i.e. informational, commenting or augmenting, literacy, instructional, and advertising texts). Each text involved three kinds of comprehension tasks including finding information in texts, drawing text-related conclusions, and reflecting and assessing an overall message of a text. The majority of tasks used a multiple-choice format whereas some tasks used a decision-making or a matching format. Decision-making tasks required students to assess whether each statement was correct or incorrect, whereas matching tasks involved selecting and assigning titles to different sections of a text (see Gehrer, Zimmermann, Artelt, & Weinert, 2012, for more detailed descriptions and sample items of the test).

The test was administered at T1 (grade 5) and T3 (grade 7). It consisted of 32 items at T1 and 40 items at T3. The measurement invariance of the competence scores from two occasions was supported, and the test was linked in order to allow a direct comparison of the competence scores across time (Fischer, Rohm, Gnambs & Carstensen, 2016). At T3, respondents were administered different test versions depending on their scores at T1. Low-ability respondents received a test with less difficult items whereas high-ability respondents received a test with more difficult items. Students' reading comprehension scores were provided in the form of weighted maximum likelihood estimates (WLEs). The use of WLE score over sum/average score is highly recommended by the NEPS psychometricians as it takes into account the difficulties of each item. According to the NEPS technical report (Pohl et al., 2012), reliabilities of the test were satisfactory at T1 (WLE reliability = .77) and at T3 (WLE reliability = .78 for the low-ability test, and .76 for the high-ability test).

2.2.3. Reading amount

     Reading amount was measured with a single item asking how much time per day students normally read outside school. This self-reported question was answered with five options (1 = *not at all*, 2 = *up to half an hour*, 3 = *between half an hour and one hour*, 4 = *one to two hours*, and 5 = *more than two hours*). In the NEPS, reading amount was measured at three time points. The test-retest reliability of this single item scale was sufficient (.48 from T1 to T2, and .53 from grades T2 to T3).

2.2.4. Control variable: Types of school track

     Students were asked whether they attended academic track schools which prepare students for higher education, or nonacademic track schools which emphasize on vocational training. In total, 1,880 native and 284 immigrant students attended academic track schools whereas 1,213 native and 289 immigrant students attended nonacademic track schools. The remaining students who attended neither academic nor nonacademic track schools (e.g. comprehensive schools) were excluded from the analyses.

2.3. Statistical analyses

     Prior to the multi-group analyses of structural equation models, measurement invariance tests were conducted across time and groups for intrinsic reading motivation. Then, we estimated a multi-group cross-lagged panel model for testing the reciprocal relations between intrinsic reading motivation and reading competence. In this model, intrinsic reading motivation in grades 5 and 7 were represented as latent variables, while reading competence in grades 5 and 7 were treated as manifest variables. Furthermore, we specified a multi-group structural equation model for testing indirect effects of grade 5 intrinsic reading motivation on grade 7 reading competence through grade 6 reading amount while controlling for grade 5 reading competence. In this model, reading amount was added as a manifest variable.

     First, all path coefficients of these models were compared between native and immigrant students. Then, in order to take into account the types of school track as a potentially confounding variable, we compared the following four groups of students: 1 = native students in nonacademic track schools, 2 = immigrant students in nonacademic track schools, 3 = native students in academic track schools, and 4 = immigrant students in academic track schools.

     In order to examine whether each observed effect was significantly different

between groups, we compared an initial model in which each observed effect was freely estimated and a model which constrained each effect to be equal between groups. Then, we conducted a chi-square different test to see whether these two models were significantly different from each other. If the initial model was significantly better than the constrained model, we concluded that the observed effect was significantly different between groups. All models were estimated with the maximum likelihood estimation using the lavaan package of program R 3.2.1 (Rosseel, 2012). The average rate of missing values per variable was 10.82 %. All missing values were dealt with the full information maximum likelihood method (FIML) option in lavaan.

3. Results

3.1. Descriptive statistics

Table 1 represents means and standard deviations of all relevant variables of native and immigrant students. Both groups of students did not significantly differ in the levels of intrinsic reading motivation in grades 5 and 7. There was also no effect of intrinsic reading motivation on reading competence for both groups. Native students significantly outperformed immigrant students in reading competence in grades 5 and 7. There were moderate to large effects of the differences in students' immigration background on reading competence. Finally, immigrant students read significantly less frequently compared to native students. There was a small effect of the differences in students' immigration status on reading amount.

Inter-correlations among all variables for native and immigrant students are indicated in Table 2. Attending upper track schools was significantly and positively associated with intrinsic reading motivation, reading amount, and reading competence from grades 5 to 7 for native and immigrant students. Students in more academically advanced school tracks seem to have higher intrinsic reading motivation, reading amount, and reading competence than those in less advanced school tracks regardless of students' immigration status. Furthermore, intrinsic reading motivation, reading amount, and reading competence were significantly and positively correlated with each other for both native and immigrant students.

3.2. Measurement invariance testing

Prior to the analyses, we conducted measurement invariance tests of intrinsic reading motivation across time (grade 5 and grade 7) and groups (native and immigrant students). Given that the purpose of the present study is to directly compare path

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coefficients across groups, the assumption of the least restricted model (configural invariance) and the second least restricted model (metric invariance) have to be met (Milfont & Fischer, 2010).

Fit indices of the configural invariance model were satisfactory across time (χ^2 = 135.81, df = 8, p = .000, CFI= .997, RMSEA = .062) and groups (χ^2 = 753.96, df = 60, p = .000, CFI= .975, RMSEA = .071). Thus, the general factor structure of intrinsic reading motivation was considered to be the same across time and groups. Fit indices of the metric invariance model were also good across time (χ^2 = 233.58, df = 12, p = .000, CFI= .994, RMSEA = .066) and groups (χ^2 = 764.27, df = 68, p = .000, CFI= .974, RMSEA = .067). In addition, the imposition of constraints of factor loadings did not significantly deteriorate the approximation of the data across time (ΔCFI = .003, ΔRMSEA = -.004) and groups (ΔCFI = .001, ΔRMSEA = .004). Thus, all path coefficients in the models can be compared across time and groups.

3.3. Reciprocal relations between intrinsic reading motivation and reading competence

The estimated multi-group cross-lagged panel model showed a good fit (χ^2 = 1075.25, df = 100, p = .000, CFI = .967, RMSEA = .065, SRMR = .046). The results of all standardized path coefficients for the model can be found in Figure 1. Consistent with our hypothesis, we observed significant and positive cross-lagged effects of grade 5 reading competence on grade 7 intrinsic reading motivation for both native (β = .19, p < .01) and immigrant students (β = .22, p < .01). As expected, there was also a significant positive cross-lagged effect of grade 5 intrinsic reading motivation on grade 7 reading competence for native students (β = .13, p < .01). However, contrary to our hypothesis, the effect of grade 5 intrinsic reading motivation on grade 7 reading competence was not significant for immigrant students (β = .02, p > .05). This effect was also found to be significantly weaker for immigrant students than for native students ($\Delta\chi^2$ = 7.26, df = 1, p < .01).

3.4. A mediating role of reading amount

The specified mediation model showed a good fit (χ^2 = 374.14, df = 36, p = .000, CFI = .979, RMSEA = .064, SRMR = .039). The results of all path coefficients for the model are presented in Figure 2. As expected, the effect of grade 5 intrinsic reading motivation on grade 6 reading amount was significant for both native (β = .45, p < .01) and immigrant students (β = .38, p < .01). Furthermore, as hypothesized, the effect of grade 6 reading amount on grade 7 reading competence was significant for

both native (β = .18, p < .01) and immigrant students (β = .10, p < .01). However, this effect was found to be significantly lower for immigrant students than for native students ($\Delta\chi^2$ = 4.64, df = 1, p < .05). In addition, both groups had significant indirect effects of grade 5 intrinsic reading motivation on grade 7 reading competence through grade 6 reading amount. This indirect effect was also found to be significantly lower for immigrant students (β = .04, p < .01) than for native students (β = .08, p < .01, $\Delta\chi^2$ = 7.78, df = 2, p < .05).

3.5. The influence of academic or nonacademic track schools

In order to exclude the influence of school tracks on the tested models, we replicated and compared the models among the following four groups: 1) native students in nonacademic track schools, 2) immigrant students in nonacademic track schools, 3) native students in academic track schools, 4) immigrant students in academic track schools. The multi-group cross-lagged panel model showed a good fit (χ^2 = 980.34, df = 208, p = .000, CFI = .966, RMSEA = .064, SRMR = .048). The results of all path coefficients for this model are presented in Figure 3.

The cross-lagged effects of grade 5 reading competence on grade 7 intrinsic reading motivation was significant and positive for native and immigrant students in academic track schools (β = .16, p < .01; β = .21, p < .01, respectively) as well as in nonacademic track schools (β = .16, p < .01; β = .15, p < .01, respectively). However, the cross-lagged effect of grade 5 intrinsic reading motivation on grade 7 reading competence was found to be significant only for the native group and not for the immigrant group. This was true for both academic track schools (β = .10, p < .01 for native students; β = -.03, p > .05 for immigrant students) and nonacademic track schools (β = .14, p < .01 for native students; β = .01, p > .05 for immigrant students). Furthermore, this effect was found to be significantly lower for immigrant students than for native students in nonacademic track schools ($\Delta\chi^2$ = 3.96, df = 1, p < .05).

The multi-group mediation model showed a good fit (χ^2 = 332.65, df = 76, p = .000, CFI = .978, RMSEA = .061, SRMR = .042). The results of all path coefficients for the model are presented in Figure 4. Grade 5 intrinsic reading motivation had significant positive effects on grade 6 reading amount for native and immigrant students regardless of their track schools (academic: β = .44, p < .01; β = .36, p < .01, respectively; nonacademic: β = .38, p < .01; β = .35, p < .01, respectively). Moreover, grade 6 reading amount had significant positive effects on grade 7 reading competence for native and immigrant students in academic track schools (β = .16, p < .01; β = .17, p

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< .01, respectively). However, in nonacademic track schools, the effect of grade 6 reading amount on grade 7 reading competence was significant only for native students (β = .18, p < .01) and not for immigrant students (β = .05, p > .05). In addition, this effect was found to be significantly lower for immigrant students than for native students ($\Delta\chi^2$ = 4.93, df = 1, p < .05).

There was a significant and positive indirect effect of grade 5 intrinsic reading motivation on grade 7 reading competence through grade 6 reading amount for native students regardless of their school tracks (β = .07, p < .01 for academic tracks and β = .07, p < .01 for nonacademic tracks). This indirect effect was significant for immigrant students in academic track schools (β = .06, p < .01) but not in nonacademic track schools (β = .02, p > .05).

3.6. Supplementary analyses on the influence of the language use for reading

Because the items for intrinsic reading motivation and reading amount were not language-specific, it is unknown whether immigrant students answered these questions with reference to reading in their first language or in German. To find this out, we conducted supplementary analyses based on the item that addresses *the language use for reading books*. This question was asked only for students who learned other languages than German as a family language in their childhood. In fact, the majority of these students (88.2 %) answered that they read only or mostly in German. Nevertheless, we replicated the mediation model with the students who read only or mostly in German (n = 2,435) and students who read only or mostly in other languages (n = 147) in order to see if the language use for reading has any effects on the relations among intrinsic reading motivation, reading amount, and reading competence. Students who answered that this question did not apply to them (n = 180) were excluded from the analyses.

The model showed a good fit (χ^2 = 171.89, df = 36, p = .000, CFI = .980, RMSEA = .054, SRMR = .043). The results showed that within a group of students who read only or mostly in German, intrinsic reading motivation positively predicted reading amount (β = .38, p < .01), and reading amount positively predicted reading competence (β = .14, p < .01). In addition, there was a significant and positive indirect effect of intrinsic reading motivation on reading competence through reading amount for this group (β = .05, p < .01). However, within a group of students who read only or mostly in non-German languages, intrinsic reading motivation did not significantly predict reading amount (β = .06, p > .05), and reading amount also did not significantly contribute to reading competence (β = -.06, p > .05). There was also no significant

indirect effect of intrinsic reading motivation on reading competence through reading amount ($\beta = -.00$, $p > .05$).

4. Discussion

The aim of the present study was to investigate reciprocal relations between intrinsic reading motivation and reading competence from a longitudinal perspective in a sample of native and immigrant students in Germany. We hypothesized reciprocal-effects between intrinsic reading motivation and reading competence for both groups. We also expected that the effect of intrinsic reading motivation on reading competence would be mediated by reading amount for both groups.

4.1. Are intrinsic reading motivation and reading competence reciprocally related?

The present study provides empirical support for reciprocal effects between intrinsic reading motivation and reading competence for secondary school native students. This is in line with the findings of McElvany et al. (2008) and Schiefele et al. (2016) who also confirmed reciprocal effects between intrinsic reading motivation and reading competence in a sample of elementary school children. The present study also provides empirical evidence for the mediating role of reading amount in the effect of intrinsic reading motivation on reading competence for native students. This is consistent with previous research suggesting that when students are intrinsically motivated, they tend to read more frequently and therefore improve their reading competence (Becker et al., 2010; McElvany et al., 2008; Schaffner & Schiefele, 2016; Schaffner et al., 2013; Stutz et al., 2016).

However, the present findings are not consistent with the study of Guthrie et al. (2007) who found the relation between intrinsic reading motivation and reading competence to be unidirectional for fourth grade students. Although they observed a significant effect of students' intrinsic reading motivation on reading competence growth, they did not find a significant effect of reading competence on growth in reading motivation. However, the present study differs from their study in various ways which may have led us to different results. For instance, Guthrie et al. (2007)'s study had much smaller sample size ($n = 31$) and shorter time span (twelve-weeks) than our study. In addition, intrinsic reading motivation was measured based on interviews in their study. Finally, Guthrie et al. (2007) mentioned that all students participated in the reading intervention program which was designed to increase both intrinsic reading motivation and reading comprehension.

The present study did not provide empirical evidence for reciprocal effects between intrinsic reading motivation and reading competence for immigrant students. Our findings indicate that for immigrant students, although greater reading skills may lead to an increase in intrinsic reading motivation, higher intrinsic reading motivation does not seem to contribute to the development of reading competence. This is in line with the skill-development model, which suggests that intrinsic reading motivation is a consequence of reading competence rather than a precursor (Calsyn & Kenny, 1977; Guay et al., 2003). However, when we examined the mediating role of reading amount, we found a small but significant indirect effect of intrinsic reading motivation on reading competence through reading amount for immigrant students. Thus, it cannot be strictly concluded that intrinsic reading motivation has no effect on reading competence for immigrant students.

4.2. Does attending different school tracks matter?

The present findings confirmed reciprocal effects between intrinsic reading motivation and reading competence for native students regardless of the school tracks. However, within the immigrant sample, a reciprocal relation between intrinsic reading motivation and reading competence was not confirmed for either academic or nonacademic track students. Although there was a significant positive effect of reading competence on intrinsic reading motivation, the reverse effect of intrinsic reading motivation on reading competence was not observed. This result implies that intrinsic reading motivation may be a result of reading competence for immigrant students regardless of school tracks.

However, our findings based on the mediation model suggest that when immigrant students attend academic track schools, higher levels of intrinsic reading motivation lead to an increased reading amount, and the reading amount positively contributes to reading achievement. In contrast, when immigrant students attend nonacademic track schools, intrinsically motivated readers tend to read more frequently, but the frequency of reading seems to be unassociated with reading competence.

The present findings are partly in line with Schaffner et al. (2014) who found that the effect of intrinsic reading motivation on reading competence was significant only for academic track students and not for nonacademic track students. Carver and Leibert (1995) suggest that the amount of reading tends to promote reading competence only when students read challenging materials. Schaffner et al. (2014) assumed that in comparison to nonacademic track students, academic track students may be provided

with more challenging reading materials; thus, they should have a stronger effect of intrinsic reading motivation on reading competence.

In addition to the types of school track, the language use for reading may also be relevant for influencing the effect of intrinsic reading motivation on reading competence for immigrant students. In our supplementary analyses of the language use for reading, we found that when immigrant students read only or mostly in non-German languages, intrinsic reading motivation as well as reading amount were found to be unrelated to German reading competence. Thus, it may be important for immigrant students, especially those who attend nonacademic track schools, to have sufficient reading opportunities in German at home in order to benefit more from the effect of intrinsic reading motivation for the development of reading competence.

4.3. Limitations and future directions of the present study

The present study did not take into account the quality of reading materials that contributed to the amount of reading. Previous research has shown that intrinsic reading motivation tends to be strongly related to fiction and factual book reading while it seems to be unrelated to other forms of reading (e.g. school books, magazines, and online-texts) (McGeown, Osborne, Warhurst, Norgate, & Duncan, 2016). In addition, reading frequencies of certain types of texts (e.g. novels, stories, and tales) tend to be more strongly associated with reading competence than other types of texts (e.g. magazines, newspapers, nonfiction books, or emails, Pfost, Dörfler, & Artelt, 2013). Thus, a further look inside this processes may be obtained by using more extensive measures of reading amount such as time spent reading different types of texts (e.g. reading fiction books, comics, newspapers, etc...) when investigating relations among intrinsic reading motivation, reading amount, and reading competence.

Moreover, the present study considered the amount of reading as the only mediator of the relation between intrinsic reading motivation and reading competence. However, in addition to the amount of reading, the use of reading strategies (e.g. self-questioning, integrating, clarifying, or summarizing texts) seem to be also important for explaining the relation between intrinsic reading motivation and reading competence (Schiefele et al., 2012). For instance, previous research has shown that higher levels of reading motivation go along with more extensive use of reading strategies (Cox & Guthrie, 2001), and the effective use of reading strategies is found to be a significant predictor of reading comprehension (Andreassen & Bråten, 2010). However, empirical evidence on the indirect effect of intrinsic reading motivation on

reading competence through reading strategies is scarce. Hence, future studies should also consider the use of reading strategies as another potential mediator of the relation between intrinsic reading motivation and reading competence.

Finally, the stabilities of reading competence in the present study seem to be lower than the stabilities of comprehension measures observed in previous studies (Schaffner & Schiefele, 2016; Schiefele et al., 2016). This may be due to the longer duration of the present study (two years) compared to other previous studies (one year or shorter). Low stabilities of reading competence could facilitate the effects of intrinsic reading motivation on reading competence. Future studies with the availability of multiple comprehension measures could specify reading competence as a latent variable in a model which may contribute to the higher stabilities of the construct.

In conclusion, our findings imply that promoting enjoyment and interest in reading may improve reading achievement of native students, but it may be less relevant for developing reading competence of immigrant students. Especially with regard to immigrant students, parents and educators should emphasize the importance of having adequate reading opportunities outside the classroom (e.g. teachers may accompany students to the library and make suggestions for interesting books). In addition, it may be important for immigrant students to use the language of instruction for reading at home in order to take advantage of such reading opportunities for strengthening their reading competence.

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Notes

Table 1.

Mean values and standard deviations of all variables for native and immigrant students.

| Variables | Total ($n = 4619$) | | | Native ($n = 3907$) | Immigrant ($n = 712$) | Effect size |
	Min	*Max*	*M (SD)*	*M (SD)*	*M (SD)*	*d*
IRM (G5)	1.00	4.00	3.15 (0.78)	3.15 (0.77)	3.15 (0.79)	.00
IRM (G7)	1.00	4.00	2.80 (0.82)	2.81 (0.82)	2.75 (0.86)	.07
RA (G6)	1.00	5.00	3.09 (1.42)	3.13 (1.41)	2.91 (1.45)**	.15
RC (G5)	-4.59	4.07	0.04 (1.26)	0.14 (1.25)	-0.56 (1.14)**	.56
RC (G7)	-3.52	5.75	0.74 (1.37)	0.84 (1.35)	0.21 (1.35)**	.47

Note. Native = native students. Immigrant = immigrant students. IRM = intrinsic reading motivation. RA = reading amount. RC = reading competence. G5 = grade 5. G6 = grade 6. G7 = grade 7. **; significantly different from native students at $p < .01$.

Table 2.

Inter-correlations of all variables for native and immigrant students.

	(1)	(2)	(3)	(4)	(5)
(1) School	-				
(2) IRM (G5)	.19 / .22	-			
(3) IRM (G7)	.16 / .20	.47 / .44	-		
(4) RA (G6)	.21 / .16	.39 / .33	.48 / .36	-	
(5) RC (G5)	.38 / .47	.25 / .22	.30 / .31	.32 / .29	-
(6) RC (G7)	.43 / .52	.25 / .17	.37 / .31	.35 / .29	.60 / .64

Note. First correlation refers to native students, and second correlation refers to immigrant students. School = types of school track. IRM = intrinsic reading motivation. RA = reading amount. RC = reading competence. G5 = grade 5. G6 = grade 6. G7 = grade 7. All correlations were statistically significant at *p* < .01.
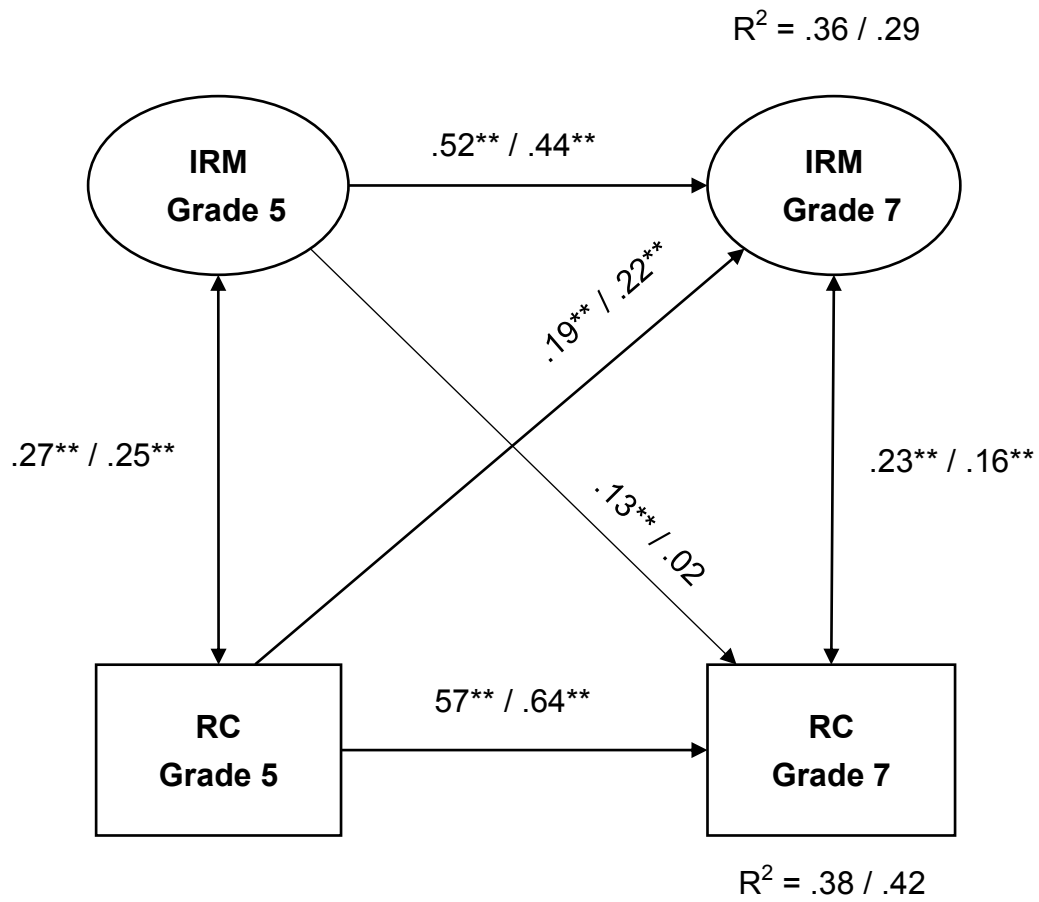
Figure 1. Multi-group cross-lagged panel model analysis (standardized path coefficients β). For each path, the first coefficient refers to native students, and the second coefficient refers to immigrant students. IRM = intrinsic reading motivation. RC = reading competence. *p* <.05; **p* < .01.
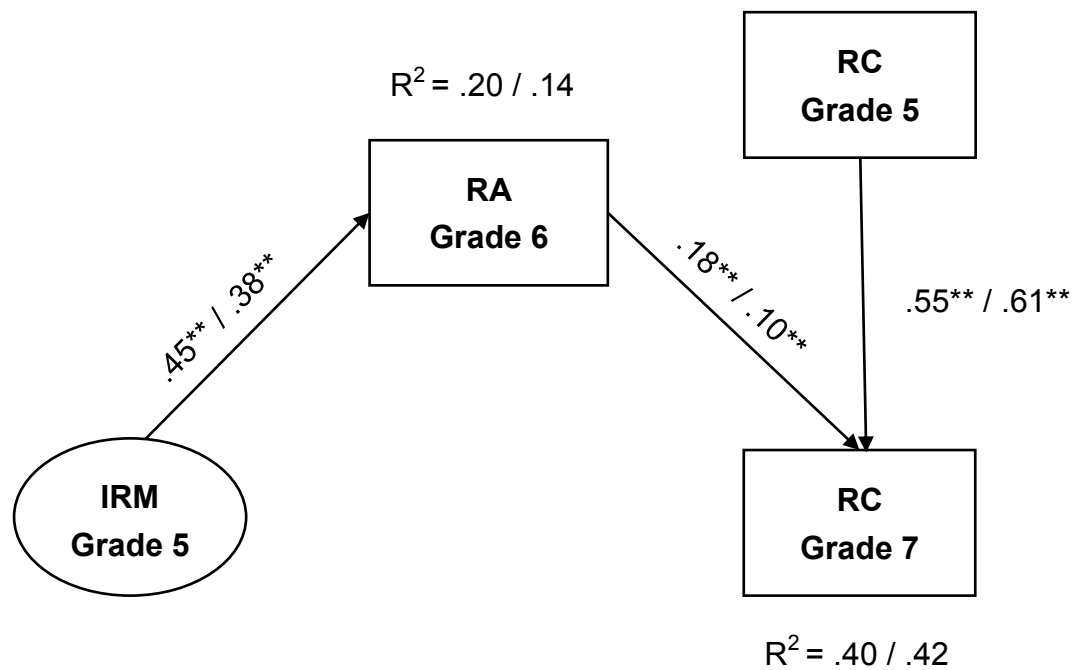
Figure 2. Multi-group structural equation model analysis (standardized path coefficients β). For each path, the first coefficient refers to native students, and the second coefficient refers to immigrant students. IRM = intrinsic reading motivation. RA = reading amount. RC = reading competence. *$p < .05$; **$p < .01$. The effects of previous reading competence (grade 5) was controlled for the model.
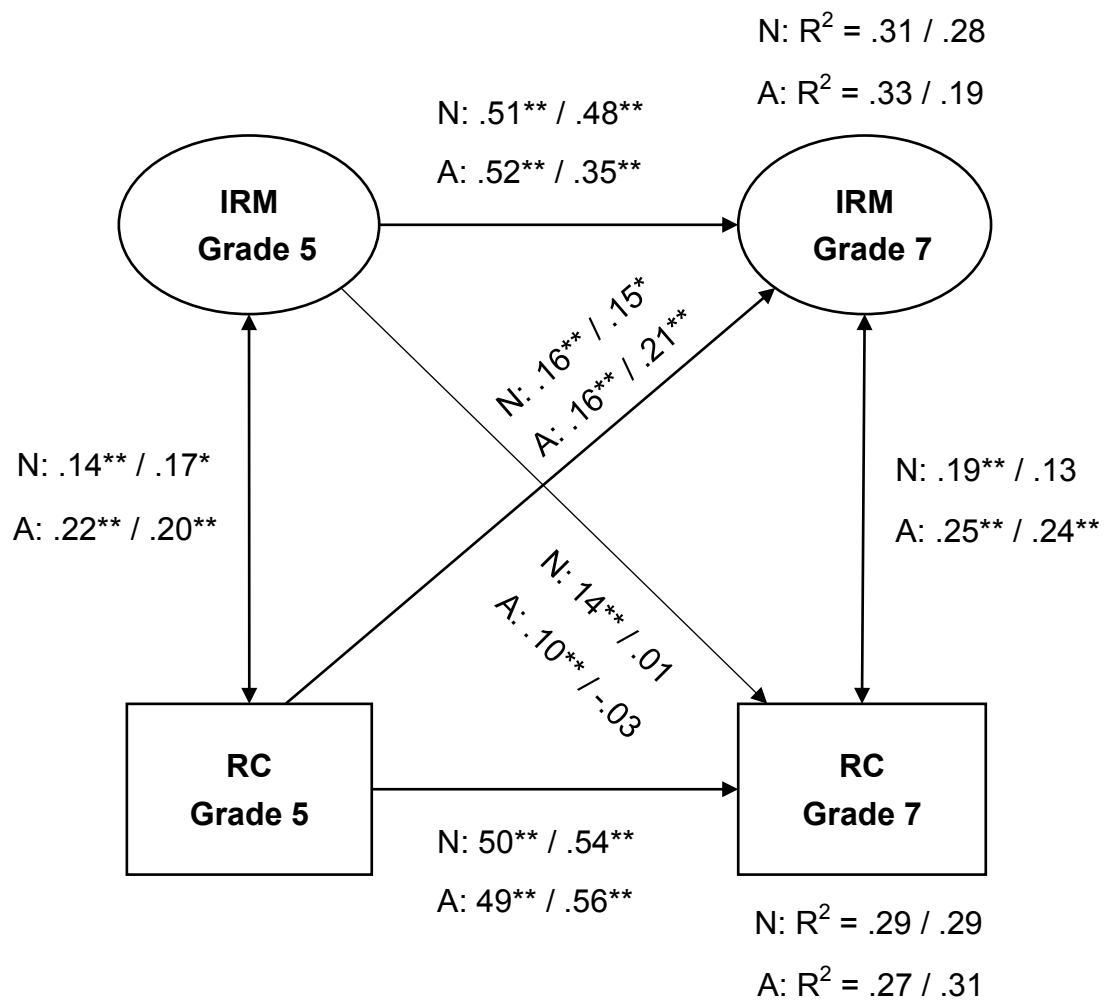
Figure 3. Multi-group cross-lagged panel model analysis (standardized path coefficients β). "N" indicates nonacademic track schools whereas "A" indicates academic track schools. For each path, the first coefficient refers to native students, and the following coefficient refers to immigrant students. IRM = intrinsic reading motivation. RC = reading competence.

*p <.05; **p < .01.
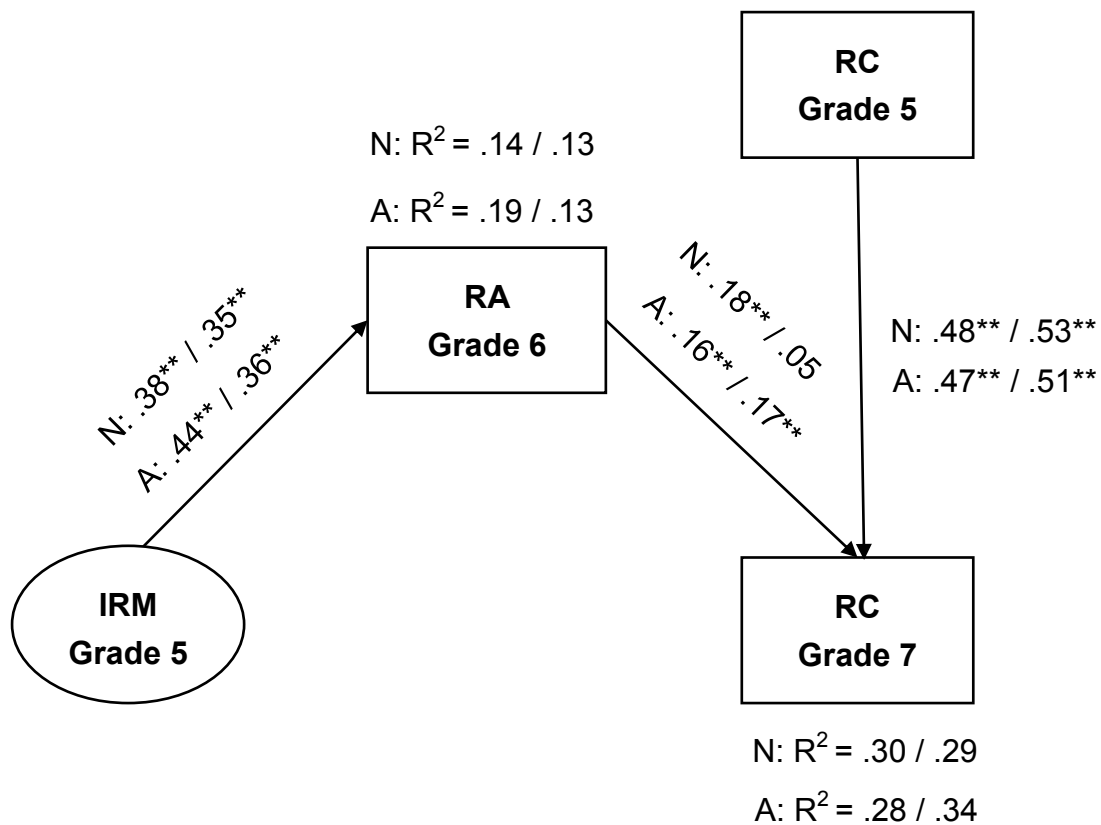
Figure 4. Multi-group structural equation model analysis (standardized path coefficients β). "N" indicates nonacademic track schools whereas "A" indicates academic track schools. For each path, the first coefficient refers to native students, and the following coefficient refers to immigrant students. IRM = intrinsic reading motivation. RA = reading amount. RC = reading competence. *$p < .05$; **$p < .01$. The effects of previous reading competence (grade 5) was controlled for the model.

2. The Relation between Intrinsic Motivation and Reading Competence: Mediating Roles of Metacognitive Knowledge of Strategy Use and Reading Amount

Ai Miyamoto, Maximilian Pfost, & Cordula Artelt

Abstract. The goal of the present study was to investigate the mechanism of how intrinsic motivation is related to reading comprehension. We hypothesized that metacognitive knowledge of strategy use and the amount of reading will explain the relation between intrinsic motivation and reading comprehension. Within the framework of German National Educational Panel Study (NEPS), 3,829 secondary school students were included in the study. As hypothesized, the effect of Grade 5 intrinsic motivation on Grade 7 reading competence was found to be mediated by Grade 6 metacognitive knowledge of strategy use as well as reading amount while controlling for Grade 5 reading comprehension and educational levels of parents. Furthermore, the studied mechanism was found to be generalizable to students with an immigration background. Results and limitations of the present study are discussed.

1. Introduction

Children who are intrinsically motivated read because they are interested in reading and they enjoy the process of reading. In contrast, children who are extrinsically motivated read because of instrumental reasons such as obtaining good grades or pleasing their parents and teachers (Becker, McElvany, & Kortenbruck, 2010; Ryan & Deci, 2000; Schiefele, Schaffner, Möller, & Wigfield, 2012; Wigfield, 1997). Intrinsic reading motivation is found to be positively associated with reading comprehension, while extrinsic motivation is found to be not significantly related or sometimes negatively related to reading comprehension, even after taking into account readers' cognitive abilities and social backgrounds (Andreassen & Bråten, 2010; Becker e al., 2010; Law, 2009; Schaffner & Schiefele, 2016; Schaffner, Schiefele, & Ulferts, 2013; Wang & Guthrie, 2004).

The positive relationship between intrinsic motivation and reading comprehension is often explained by individual differences in reading behavior; people who enjoy reading tend to comprehend texts better as they spend more time reading and use various reading strategies (Schiefele et al., 2012; Taboada, Tonks, Wigfield, & Guthrie, 2009). Despite the strong evidence for the mediating role of reading amount in the relation between intrinsic motivation and reading comprehension (Becker et al., 2010; McElvany, Kortenbruck, & Becker, 2008; Miyamoto, Pfost, & Artelt, 2017; Schaffner & Schiefele, 2016; Schaffner et al., 2013; Stutz, Schaffner, & Schiefele, 2016), so far only one study to the authors' knowledge (van Kraayenoord & Schneider, 1999) has provided strong evidence for the mediating role of metacognitive knowledge of strategy use. In addition, the extent to which metacognitive knowledge of strategy use and reading amount together explain the effect of intrinsic motivation on reading comprehension has not been investigated.

Taking this into account, the goal of the present study is to investigate the mechanism of how intrinsic motivation is related to reading comprehension by considering metacognitive knowledge of strategy use and reading amount as potential explanations for the mechanism. In addition, the present study also intends to examine whether the findings can be generalized to students with an immigration background in order to ensure that the psychological mechanisms of how intrinsic motivation is related to reading comprehension are the same for students with an immigration background.

1.1. The mechanism of how intrinsic motivation is related to reading comprehension

Primarily, there are two possible mechanisms for explaining how intrinsic

motivation contributes to the development of reading comprehension. First, intrinsically motivated readers tend to improve their reading comprehension as they spend more time reading (Becker et al., 2010; McElvany et al., 2008; Miyamoto et al., 2017; Schaffner & Schiefele, 2016; Schaffner et al., 2013; Stutz et al., 2016). This is due to the assumption that positive emotions experienced during reading (e.g. enjoyment) may reinforce readers' repeatedly engaging in reading activities (Morgan & Fuchs, 2007). According to the theory of automatic information processing (LaBerge & Samuels, 1974), "getting meaning from printed words involves a two-step process: First, the printed words must be decoded; second, the decoded words must be comprehended (Samuels, 1994, pp. 820)." Through motivated readers' increased engagement in reading, basic reading processes such as word-decoding can be more automatized; therefore, more attention can be remained for text comprehension at a deeper level (LaBerge & Samuels, 1974; Samuels, 1994).

Secondly, intrinsically motivated readers are assumed to comprehend texts better as they make an extensive use of reading strategies (Schiefele et al., 2012; Taboada et al., 2009). Intrinsically motivated readers tend to be deeply engaged with texts (e.g., getting lost in a story, experiencing imaginative actions, and empathizing with the characters), and such reading involvement is found to be positively associated with the use of elaborated and deep-level comprehension strategies (Guthrie et al., 1996; Schiefele et al., 2012). In other words, due to the deep engagement with texts, intrinsically motivated readers are more likely to select and apply strategies which help them understand texts better. Such effective use of reading strategies helps students with various comprehension processes including activating information in working memory, storing information into long-term memory, selecting important information, and constructing connections between those pieces of information (McKeachie, Pintrich, Lin, & Smith, 1986). The effective use of strategies also supports readers in monitoring their comprehension processes and modifying the way they read in order to facilitate their efforts to decode a text, understand words, and construct the meaning of a text (Anastasiou & Griva, 2009).

1.2. The scarcity of evidence on the mediating role of reading strategy use

Anmarkrud and Bråten (2009) examined relations between intrinsic motivation (i.e. reading task value), self-reported frequency of strategy use, and reading comprehension in a sample of ninth-grade Norwegian students. The results showed that self-reported frequency of strategy use was not found to be significantly related to

reading comprehension, indicating no sign of mediating effects of self-reported frequency of strategy use on the link between intrinsic motivation and reading comprehension.

One possible reason for the scarcity of evidence on the mediating effect may be attributed to the methodological weaknesses of using self-report questionnaires for measuring the use of reading strategies. Self-report questionnaires are the most frequently used instruments for measuring the use of strategies in previous research, possibly due to the convenience in design, administration, and evaluation (Gascoine, Higgins, & Wall, 2017; Winne & Perry, 2000). However, the use of self-report measures has been criticized as it often only takes into account the quantitative aspects of strategy use and disregards the qualitative aspects (Händel, Artelt, & Weinert, 2013). Previous research has shown that good readers and poor readers use the same types of strategies, but good readers use strategies more effectively than poor readers do (Grabe, 2009). In order to contribute to the understanding of text, it is important for students to be aware of "which" strategies to use, as well as "when" and "how" to use those strategies (Artelt, 2000). Thus, instruments should capture how effectively people use strategies rather than merely how often people use strategies. Another criticism associated with the use of self-report measures is that it only reflects the perceived use of strategies and not necessarily the actual usage of strategies (Artelt & Schneider, 2015). For instance, readers' perceptions of strategy use may not be accurate, as some of the complex strategies (e.g. relating the text content to personal experiences) may be used automatically and unconsciously.

Acknowledging such methodological limitations of self-report measures, Artelt and Neuenhaus (2010) recommended the use of measures of "metacognitive knowledge of strategy use (declarative metacognition)" as an alternative indicator. Metacognitive knowledge of strategy use includes qualitative aspects of strategy use as it measures the awareness or knowledge of how and when certain strategies could best be applied during reading. Metacognitive knowledge of strategy use is often measured with a scenario-based metacognitive knowledge test (e.g. Neuenhaus, Artelt, Lingel, & Schneider, 2011). Students are given a scenario such as "you have to understand and memorize a text," then provided with various strategies such as, "I concentrate on the parts of the text that are easy to understand," "I underline important parts of the text," and "I read the text aloud to another person." The strategies presented vary in their effectiveness to deal with the learning situation, and the students are required to evaluate the usefulness of each strategy in relation to other presented strategies

(Neuenhaus et al., 2011). In addition, the effectiveness of each strategy is often coded based on the judgments of experts, providing a clear benchmark of evaluation (Händel et al., 2013).

Using the data from PISA 2009, Artelt and Schneider (2015) investigated the relationships between metacognitive knowledge of strategy use, self-reported frequency of strategy use, and reading comprehension using 34 national samples. They found that metacognitive knowledge of strategy use predicted reading comprehension more strongly than the self-reported frequency of strategy use did. Their findings also imply that metacognitive knowledge of strategy use seems to be a better indicator for the effectiveness of strategy use in comparison to self-reported frequency of strategy use.

So far, only one study to authors´ knowledge has provided strong evidence for the mediating role of metacognitive knowledge of strategy use in the relationship between intrinsic motivation and reading comprehension. Van Kraayenoord and Schneider (1999) found that intrinsic motivation (i.e., reading interest) positively predicted metacognitive knowledge of strategy use, which in turn positively predicted reading comprehension. Another study by Pecjak, Podlesek, and Pirc (2011), in contrast, did not confirm such mediating effect. They found that intrinsic motivation (i.e. reading interest) did not significantly predict metacognitive knowledge of strategies, which also did not significantly predict reading comprehension. Taken together, studies are needed in order to better understand the mediating processes of how metacognitive knowledge of strategy use may explain the relationship between intrinsic motivation and reading comprehension.

1.3. Generalization to students with an immigration background

From a theoretical perspective, cognitive and psychological mechanisms of how intrinsic motivation is related to reading comprehension through metacognitive knowledge of strategy use and reading amount should be the same for all students regardless of their national or ethnic origins. However, previous research has shown that despite relatively higher levels of intrinsic motivation, immigrant students tend to have, on average, lower reading comprehension, and the relationship between intrinsic motivation and reading comprehension seems to be weaker for immigrant students in comparison to the majority (Kigel, McElvany, & Becker, 2015; Miyamoto et al., 2017; OECD, 2010; Villiger, Wandeler, & Niggli, 2014). As immigrant students seem to differ from the majority in the levels of intrinsic motivation and reading comprehension as well as the strength of the relationship between the two, it is worthwhile to test if the

mechanism of how intrinsic motivation is related to reading comprehension can be generalized to students with an immigration background.

1.4. The present study

Using data from the German National Educational Panel Study (NEPS), we aim to answer two research questions. Our first research question is "Do metacognitive knowledge of strategy use and reading amount mediate the relation between intrinsic motivation and reading comprehension? Is there a significant indirect effect of intrinsic motivation on reading comprehension through metacognitive knowledge of strategy use and reading amount?" We hypothesize that the effect of intrinsic motivation in Grade 5 on reading comprehension in Grade 7 will be mediated by metacognitive knowledge of strategy use and reading amount in Grade 6 while taking into account reading comprehension in Grade 5 and educational levels of parents. We expect that intrinsic motivation will significantly and positively predict metacognitive knowledge of strategy use and reading amount, which in turn will significantly and positively predict reading comprehension. This means that we expect to find significant positive indirect effects of intrinsic motivation on reading comprehension through metacognitive knowledge of strategy use and reading amount while controlling for previous reading comprehension and educational levels of parents.

Our second research question is "Are the results from the first research question generalizable to students with an immigration background?" We hypothesize for immigrant students to also confirm the mediating roles of metacognitive knowledge of strategy use and reading amount in the relationship between intrinsic motivation and reading comprehension and to find significant positive indirect effects of intrinsic motivation on reading comprehension through both mediators while controlling for previous reading comprehension and educational levels of parents.

2. Method

2.1. Data and Sample

The present study used data from the German National Educational Panel Study (NEPS), Starting Cohort 3. NEPS is a framework with a multi-cohort longitudinal design with the aim to investigate educational developments and outcomes through a life course (Blossfeld, Roßbach, & von Maurice, 2011). The NEPS ensures that the data are highly representative of all children attending fifth grade classes in Germany by using the stratified sampling, which not only can provide more precise estimates of the whole

population but also can control the precision of estimates for special subpopulations such as students with an immigration background (please see Aßmann et al., 2011, for more information on the use of sampling strategies in the NEPS). More than 250 schools were selected, and approximately two classes were randomly chosen from each school with over 5,000 students in the selected classes asked to take part in the study. Participants were tested at three time points: in Grade 5 in 2010 (T1), in Grade 6 in 2011 (T2), and in Grade 7 in 2012 (T3). The average age of these participants was $M = 10.50$ ($SD = 0.62$) years at T1, $M = 11.48$ ($SD = 0.60$) years at T2, and $M = 12.59$ ($SD = 0.67$) years at T3.

The first analyses included a subsample of 3,829 secondary school students who participated in the reading comprehension test both in Grades 5 and 7. 51.4 % of the subsample was male. The subsample involved participants from 379 classes in 191 schools. On average, ten students per class were included in our analyses. Within this subsample, 540 immigrant students were included in the second analyses. Immigrant students were identified based on their own and their parents´ countries of birth. When a child was born in a foreign country (1st generation), or when a child was born in Germany but whose parents were both born in foreign countries (2nd generation), he or she was considered to have an immigration background.

Other than children and their parents´ countries of birth, the NEPS also provides several identifiers for immigrant children such as their citizenship and language use. However, the use of citizenship would have raised several issues such as whether to categorize children with dual citizenship as native or immigrant children, or how to categorize children whose citizenship has changed from one country to another. The language use with parents would have been a good alternative to the citizenship as it is relevant to reading comprehension. However, as the question related to the language use was only asked to children who learned other languages than German in their childhood, the sample size of immigrant children identified by the language use became substantially smaller than the sample size identified by the country of birth of children and their parents. Taking those factors into considerations, we decided to define the immigration background based on the birthplaces of children and their parents. Furthermore, educational levels of parents were also taken into account as parents of immigrant students had, on average, fewer years of education ($M = 12.15$, $SD = 2.51$) than the parents of native students ($M = 14.20$, $SD = 2.22$) in our sample.

2.2. Measures

2.2.1. Intrinsic motivation

In the NEPS, intrinsic motivation was measured in every grade; however, we included this variable only in Grade 5 in our model due to the compatibility with other variables in the model. Intrinsic motivation was measured with items based on the reading enjoyment subscale of the Habitual Reading Motivation Questionnaire (Möller & Bonerad, 2007). Due to the nature of the large scale assessment, the number of items that can be included in the questionnaire was restricted. The experts in the NEPS carefully selected three of the five items from the original scale. The experts chose the items which cover the breadth of the construct in a general context. In addition, the length and the linguistic level of the items were also taken into account with the compatibility to other age cohorts of the NEPS data. The selected three items included such statements as "I enjoy reading books" and "I think that reading is interesting." All items were answered on a four-point rating scale from 1 (*do not agree at all*) to 4 (*completely agree)*. The scale of the selected three items had a very good internal consistency ($\alpha = .91$).

2.2.2. Metacognitive knowledge of strategy use (declarative metacognition)

Metacognitive knowledge of strategy use was measured in Grade 6 with the scenario-based comprehension test developed within the framework of NEPS. Based on the previous work on metacognitive knowledge (Artelt, Beinicke, Schlagmüller, & Schneider, 2009; Schlagmüller & Schneider, 2007) as well as through qualitative interviews with students and teachers, researchers in the NEPS constructed 15 scenarios describing different school and leisure-time activities and assessing different aspects of strategy knowledge. Based on the two pilot studies, the validity of the test was examined, and a total of eight scenarios were selected for the final version of the test (see Händel et al., 2013 for more information on the development and evaluation of a test instrument).

For each scenario, six strategies with varying levels of usefulness were presented, and students were asked to rate the usefulness of each strategy, relative to the specific reading or learning demands presented in the scenario, on a four-point Likert scale (1 = *not at all useful*, 4 = *very useful*). The pair comparisons of presented strategies were made with reference to experts' judgments on the relative usefulness of the strategies (e.g., strategy X is more useful than strategy Y). Based on the expert ratings, students' responses were recoded into dichotomous responses (in line or not in line with the judgements of experts for each pair comparison). The pair comparison was

considered to be valid for assessing metacognitive knowledge of strategy use if at least 75 percent of the ten experts agreed that one strategy was superior to the other within the pair. 63 of the 84 pair comparisons reached this criterion. Each scenario included 7 to 11 valid pair comparisons in the final version of the test (see Lockl, 2013; Händel et al., 2013, for more information on the description of the test). The test had a good internal consistency ($\alpha = .89$).

2.2.3. Reading amount

In the NEPS, the amount of reading was measured in every grade; however, we included this variable only in Grade 6 in our model due to the compatibility with other variables in the model. The amount of reading was measured in Grade 6 with two indicators of reading frequency outside of school. Students were asked to respond to the following two questions: 1) how much time do you usually spend reading outside of school on a *normal school day*? and 2) how much time do you usually spend reading outside of school on a *normal non-school day*? These two statements were answered with a five-point rating scale (*1 = not at all, 2 = up to half an hour, 3 = between half an hour and one hour, 4 = one to two hours, and 5 = more than two hours*). The scale of the two indicators showed good internal consistency ($\alpha = .87$).

2.2.4. Reading comprehension

Reading comprehension was measured in Grade 7 with the reading comprehension test developed within the NEPS framework (Gehrer, Zimmermann, Artelt, & Weinert, 2012). This test was developed based on various text comprehension theories (see Gehrer, Zimmermann, Artelt, & Weinert, 2013, for more information on theoretical considerations of the test). The test included five types of continuous texts with a length of approximately 200 to 550 words (i.e. informational, commenting, literacy, instructional, and advertising texts). For each text type, participants were asked to find information in a text, draw text-related conclusions, and understand an overall message of a text. Questions were answered in the forms of multiple-choice, decision-making (judging a statement as either correct or incorrect), or matching (selecting and assigning titles to different sections of a text; see Gehrer et al., 2012, for more information on the description of the test). The test contained 40 items in total and scores were provided in the form of weighted likelihood estimates (WLE; Warm, 1989). WLE is suggested to be less biased than other estimation methods that are used in item response theory for parameter estimation such as maximum likelihood estimation

(MLE; Lord, 1980). Higher scores corresponded to higher reading comprehension abilities. The WLE reliabilities of the two versions of the test were satisfactory (> .76; Pohl, Haberkorn, Hardt, & Wiegand, 2012).

As a controlling variable, previous reading comprehension was measured in Grade 5 with the reading comprehension test, which was constructed based on the same theoretical considerations as the test administered in Grade 7 (Gehrer et al., 2013). The Grade 5 reading comprehension test also had a parallel test structure to the Grade 7 reading comprehension test in terms of text types, comprehension tasks, and question formats. The Grade 5 reading test was statistically linked with the Grade 7 reading test and the measurement invariance of reading comprehension across time and across groups based on gender, socio-economic status, and immigration background was supported (Fischer, Rohm, Gnambs, & Carstensen, 2016, Pohl et al., 2012). The WLE reliability of the test was also acceptable (.77).

2.3. Statistical analyses

All analyses were conducted based on the structural equation models estimated using the lavaan package of the program R 3.2.1 (Rosseel, 2012). In the model, Grade 5 intrinsic motivation was specified as a predictor of Grade 6 metacognitive knowledge of strategy use and Grade 6 reading amount, which in turn were included as predictors of Grade 7 reading comprehension. In addition, Grade 5 reading comprehension was included as a predictor of Grade 7 reading comprehension. Grade 5 reading comprehension was also allowed to covariate with the rest of the variables in the model. Finally, educational levels of parents, measured with the years of education, were controlled for the model by being specified as a predictor of all other variables in the model.

All models were estimated with the maximum likelihood estimation. The average rate of missing values per variable was 4.98%. To deal with missing values, we have applied the full information maximum likelihood method (FIML). This method allows us to analyze each case available in a data and compute maximum likelihood estimates of a parameter. The evaluation of model fit was based on the comparative fit index (CFI), and the root mean square error of approximation (RMSEA), which have been widely used in research (McDonald & Ho, 2002). A *good* level of fit was indicated when CFI exceeded 0.95 and when RMSEA was less than 0.05. The fit of a model was considered to be acceptable when CFI was larger than 0.90 and when RMSEA was less than 0.08 (McDonald & Ho, 2002). Because the chi-square statistic can be sensitive to a

large sample size (Hooper, Coughlan, & Mullen, 2008), we still considered a model as having a "good fit" when the p-value was < .05.

3. Results

3.1. How is intrinsic motivation related to reading comprehension?

Table 1 shows mean values and standard deviations and Table 2 indicates inter-correlations for all relevant variables for the full sample as well as for immigrant sample. Intrinsic motivation, metacognitive knowledge of strategy use, reading amount, and reading comprehension in Grades 5 and 7 were all positively and significantly correlated with each other.

Figure 1 represents the structural equation model used to test the mediating effects of metacognitive knowledge of strategy use and reading amount on the relation between intrinsic motivation and reading comprehension while taking into account previous reading comprehension and educational levels of parents. The fit of the model was acceptable ($\chi^2 = 337.97$, $df = 17$, $p < .001$, CFI = .979, RMSEA = .070). There was a small significant positive direct effect of intrinsic motivation on reading comprehension ($\beta = .05$, $p = .004$). Furthermore, intrinsic motivation significantly and positively predicted metacognitive knowledge of strategy use ($\beta = .22$, $p < .001$) as well as reading amount ($\beta = .51$, $p < .001$). In addition, reading comprehension was positively and significantly predicted by metacognitive knowledge of strategy use ($\beta = .28$, $p < .001$) and reading amount ($\beta = .11$, $p < .001$).

The standardized indirect effects were (.22) (.28) = .06 through metacognitive knowledge of strategy use, and (.51) (.11) = .06 through reading amount. We tested the significance of these indirect effects using the bootstrapping procedure. Unstandardized indirect effects were computed for each of 10,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardized indirect effect through metacognitive knowledge of strategy use was 0.09, and the 95% confidence interval ranged from 0.08 to 0.11. The bootstrapped unstandardized indirect effect through reading amount was 0.09, and the 95% confidence interval ranged from 0.06 to 0.12. Therefore, both indirect effects were statistically significant ($p < .05$). Overall, 46 percent of variability in reading comprehension was explained by the variables within the hypothesized model.

3.2. Is the mechanism generalizable to immigrant students?

Figure 2 illustrates the structural equation model of students with an immigration background only. The model showed a good fit (χ^2 = 27.29, df = 17, p = .054, CFI = .995, RMSEA = .033). First, there was no significant direct effect of intrinsic motivation on reading comprehension (β = -.02, p = .572). Furthermore, intrinsic motivation significantly and positively predicted metacognitive knowledge of strategy use (β = .14, p = .005) and reading amount (β = .41, p < .001). In addition, reading comprehension was significantly and positively predicted by metacognitive knowledge of strategy use (β = .25, p < .001) as well as by reading amount (β = .09, p = .044).

The standardized indirect effects were (.14) (.25) = .04 through metacognitive knowledge of strategy use, and (.41) (.09) = .04 through reading amount. The bootstrapped unstandardized indirect effect through metacognitive knowledge of strategy use was .05, and the 95% confidence interval ranged from .01 to .10. The bootstrapped unstandardized indirect effect through reading amount was .06, and the 95% confidence interval ranged from .01 to .12. Thus, both indirect effects were statistically significant (p < .05). Overall, 50 percent of variability in reading comprehension was explained by the variables within the hypothesized model.

4. Discussion

The aim of the present study was to investigate the mechanism of how intrinsic motivation is related to reading comprehension through metacognitive knowledge of strategy use and reading amount, and whether this mechanism can be generalized to students with an immigration background. We hypothesized that both metacognitive knowledge of strategy use and the amount of reading in Grade 6 will explain the relation between intrinsic motivation in Grade 5 and reading comprehension in Grade 7 while controlling for reading comprehension in Grade 5 and educational levels of parents. We also hypothesized that the studied mechanisms can be generalized to students with an immigration background.

4.1. The mediating roles of metacognitive knowledge of strategy use and reading amount

We examined whether metacognitive knowledge of strategy use and reading amount will mediate the relation between intrinsic motivation and reading comprehension. Consistent with our hypothesis, the present study provides strong empirical evidence on the partial mediation of the relation between intrinsic motivation

and reading comprehension by metacognitive knowledge of strategy use and reading amount while controlling for previous reading comprehension and educational levels of parents. The present study is in line with previous research which has also confirmed the mediating effect of reading amount (Becker et al., 2010; McElvany et al., 2008; Miyamoto et al., 2017; Schaffner & Schiefele, 2016; Schaffner et al., 2013; Stutz et al., 2016) as well as metacognitive knowledge of strategy use on the relation between intrinsic motivation and reading comprehension (van Kraayenoord & Schneider, 1999).

These findings suggest that individuals who enjoy reading tend to become better at comprehending texts as they spend more time reading and use strategies more effectively. We also found that the indirect effects of intrinsic motivation on reading comprehension through metacognitive knowledge of strategy use and through reading amount were similar in size. This finding suggests that both metacognitive knowledge of strategy use and reading amount seem to be equally important in explaining the relation between intrinsic motivation and reading comprehension.

However, the present findings are inconsistent with the study of Pecjak et al (2011), which examined how various cognitive, motivational, and emotional factors affected reading comprehension in a sample of fifth grade Slovenian students. Their results provided no empirical evidence for significant direct or indirect effects of intrinsic motivation on reading comprehension through metacognitive knowledge of reading strategies.

Several differences in study designs as well as methodologies can be attributed to differing findings between the study of Pecjak et al (2011) and the present study. First, the study of Pecjak et al (2011) had a much smaller sample size ($n = 205$), leading to larger standard errors than the present study ($n = 3829$). Second, the study of Pecjak et al (2011) used cross-sectional data, whereas the present study used longitudinal data. Finally, the study of Pecjak et al (2011) did not take into account reading amount, previous reading comprehension, and educational levels of parents, which were included in the present study.

4.2. A generalization of the mediating processes to students with an immigration background

We investigated whether the mechanism of how intrinsic motivation is related to reading comprehension can be generalized to students with an immigration background. As hypothesized, the present study provided strong evidence for the mediating roles of both metacognitive knowledge of strategy use and reading amount in

the association between intrinsic motivation and reading comprehension for immigrant students. Regardless of students´ immigration origins, both metacognitive knowledge of strategy use and reading amount seem to be equally important in explaining the relationship between intrinsic motivation and reading comprehension.

As the mechanism of how intrinsic motivation is related to reading comprehension is generalizable to students with an immigration background, promoting intrinsic motivation especially in combination with training on the application of reading strategies (see McNamara, 2007, for an overview of various strategy interventions) and the provision of reading opportunities outside of school (e.g., easy access to library) might lead to comparable positive effects on reading comprehension, independent of students´ immigration status.

4.3. Strengths, limitations, and future directions of the present study

A large sample size combined with the longitudinal study design allowed for the investigation of the relations among relevant variables over the course of several school years. However, despite the longitudinal approach, the present findings are still only correlational, and correlations do not necessarily infer causations (c.f. Foster, 2010). Thus, future studies using an experimental design may be useful in order to draw more strict conclusions on the causal relations among intrinsic motivation, metacognitive knowledge of strategy use, reading amount, and reading comprehension.

Moreover, as present findings are based on the sample of fifth to seventh grade students, it is not clear to what extent, these findings can be generalized to other age groups of children. A recent meta-analytic review (Taylor et al., 2014) has shown that the relation between intrinsic motivation and academic achievement was stronger for high school and college students than for elementary school students. Hence, the mechanism of how intrinsic motivation contributes to the development of reading comprehension may differ across age groups, and it needs to be further examined for a variety of age groups of students.

Furthermore, although the relationship between intrinsic motivation and reading comprehension is likely to be reciprocal (Morgan & Fuchs, 2007), it was found to be unidirectional for immigrant students (Miyamoto et al., 2017). The present study could not fully take into account the directionality of the relation due to the availability of variables that were tested longitudinally. Future studies with more extensive longitudinal measures of relevant variables are needed in order to further investigate the relation between intrinsic motivation and reading comprehension from a reciprocal

perspective.

Finally, the present study used metacognitive knowledge of strategy use as a proxy for students' effective use of strategies, assuming that students who are more knowledgeable about how to use strategies effectively would also use strategies more effectively. However, it is also important to mention that the knowledge of strategy use is not always the same as the actual usage of strategies. Thus, the mediating role of the actual use of strategies instead of the knowledge of strategy use in the relationship between intrinsic motivation and reading comprehension should be further examined in future research.

5. Conclusion

In summary, the present study has provided strong empirical support for the mediating roles of metacognitive knowledge of strategy use and reading amount in the relation between intrinsic motivation and reading comprehension. From a practical perspective, it may be of high relevance to parents and educators who promote intrinsic motivation in classrooms to teach students when and how to use reading strategies, and also to provide adequate reading opportunities outside classrooms in order to foster reading comprehension, especially for those with an immigration background, who often show, on average, lower reading comprehension compared to the majority students.

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Table 1.

Mean values and standard deviations of relevant variables for the whole sample as well as for immigrant students.

Variables	Total			Immigrant students
	Min	*Max*	*M (SD)*	*M (SD)*
Intrinsic motivation (Grade 5)	1.00	4.00	3.09 (0.90)	2.98 (0.94)
Metacognitive knowledge of strategy use (Grade 6)	0.00	0.99	0.73 (0.15)	0.66 (0.16)
Reading amount (Grade 6)	1.00	5.00	3.06 (1.23)	2.92 (1.29)
Reading comprehension (Grade 7)	-3.55	5.64	0.63 (1.36)	0.08 (1.33)
Reading comprehension (Grade 5)	-3.62	4.07	0.09 (1.24)	-0.52 (1.13)

Table 2.

Inter-correlations of relevant variables for the whole sample as well as for immigrant students.

	(1)	(2)	(3)	(4)	(5)
(1) Intrinsic motivation (Grade 5)	-	.14**	.38**	.18**	.25**
(2) Metacognitive knowledge of strategy use (Grade 6)	.23**	-	.25**	.55**	.54**
(3) Reading amount (Grade 6)	.47**	.27**	-	.30**	.31**
(4) Reading comprehension (Grade 7)	.28**	.55**	.33**	-	.66**
(5) Reading comprehension (Grade 5)	.27**	.52**	.31**	.62**	-

Note. Correlations below the diagonal line refer to the whole sample, while correlations above the diagonal line refer to immigrant students. ** $p < .01$.

Figure 1: The effect of intrinsic motivation on reading comprehension mediated by metacognitive knowledge of strategy use and reading amount for the whole sample.
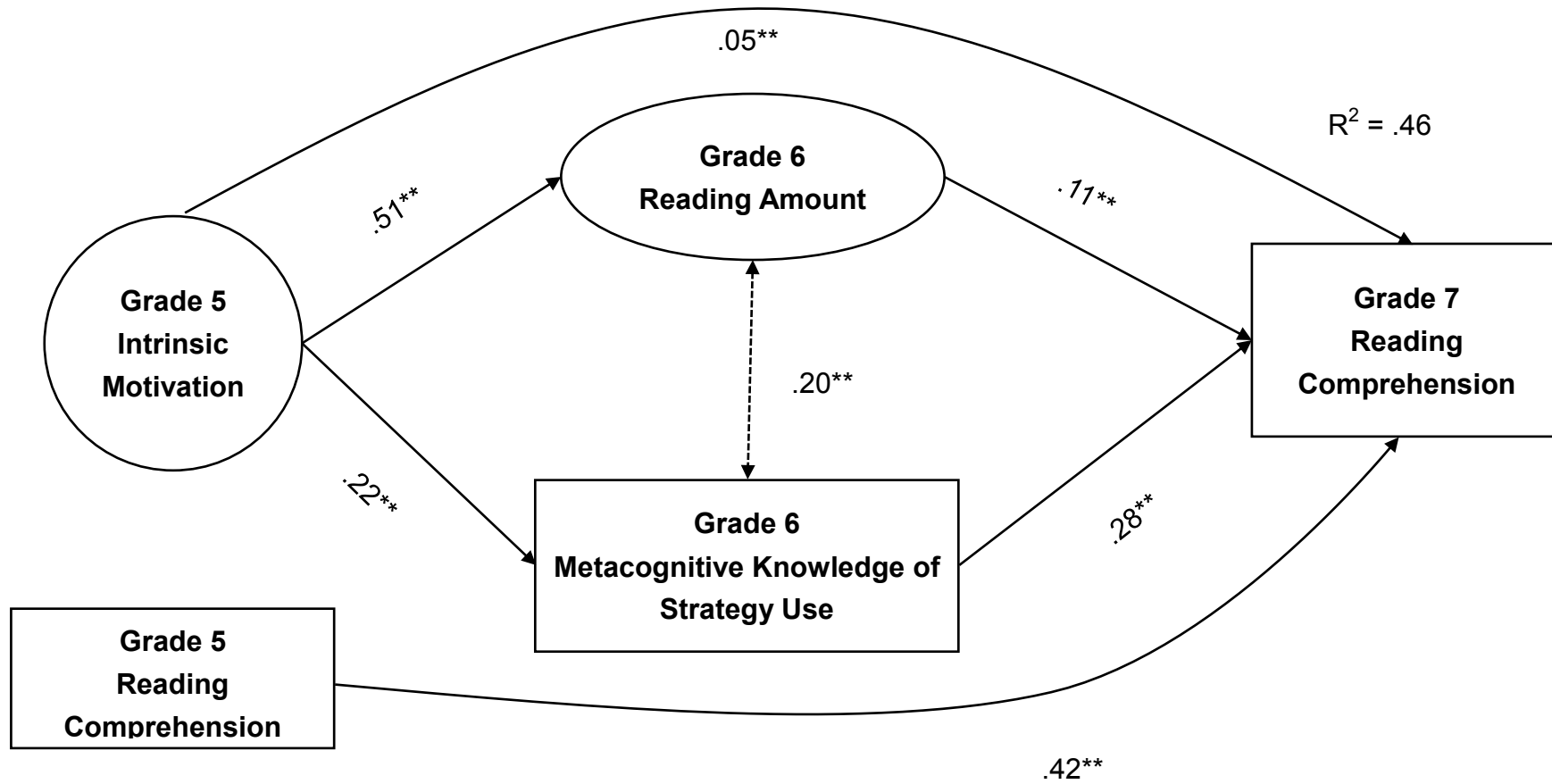
Note: Path coefficients are significant at *p* < .05, **p* < .01. Grade 5 reading comprehension was allowed to covariate with Grade 5 intrinsic motivation, Grade 6 reading amount, and Grade 6 metacognitive knowledge of strategy use. Educational levels of parents were controlled for the model by being specified as a predictor of all variables in the model.

Figure 2: The effect of intrinsic motivation on reading comprehension mediated by metacognitive knowledge of strategy use and reading amount for immigrant students.
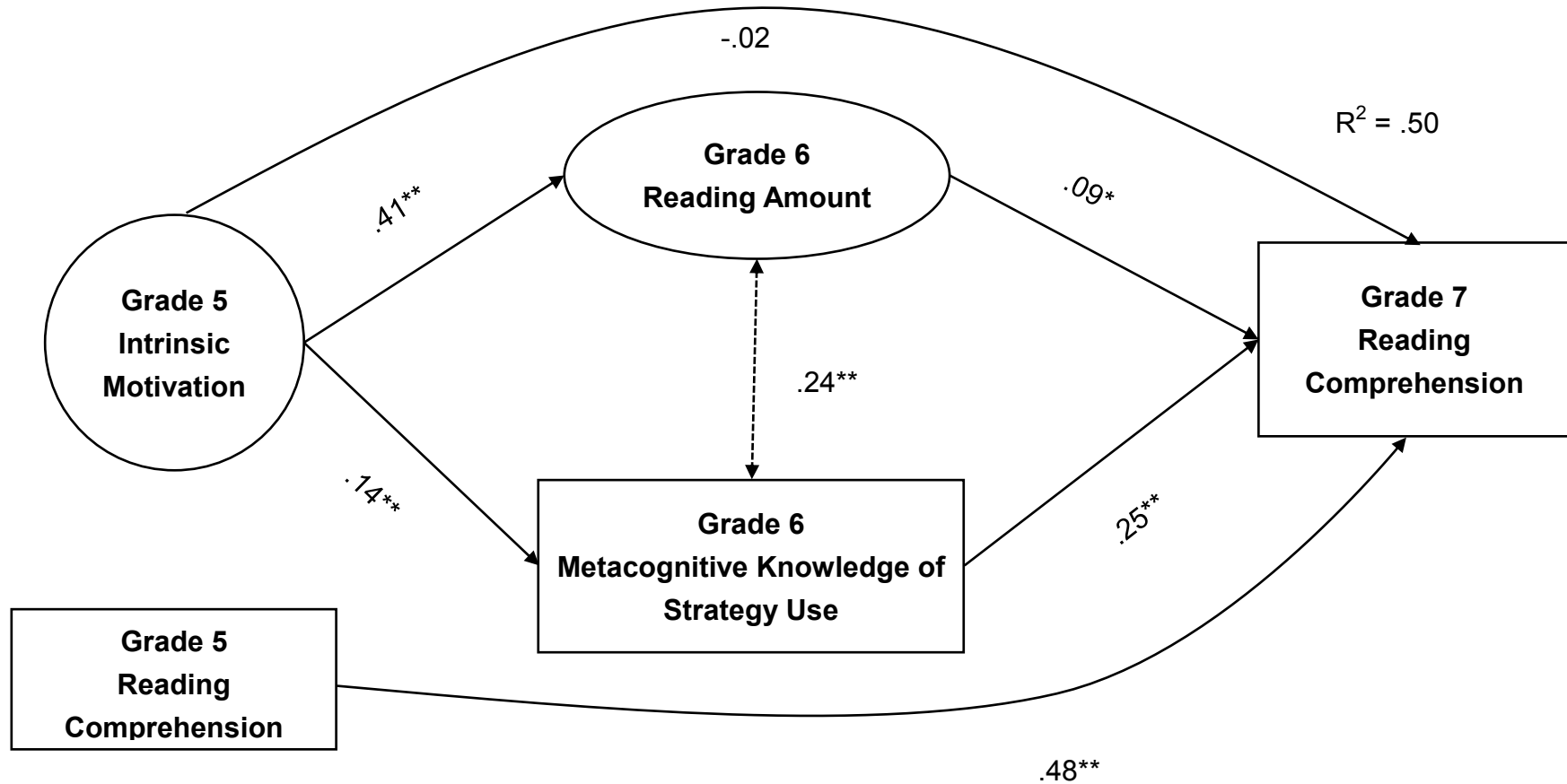
Note: Path coefficients are significant at *p < .05, **p < .01. Grade 5 reading comprehension was allowed to covariate with Grade 5 intrinsic motivation, Grade 6 reading amount, and Grade 6 metacognitive knowledge of strategy use. Educational levels of parents were controlled for the model by being specified as a predictor of all variables in the model.

3. Immigrant Students' Achievements in Light of Their Educational Aspirations and Academic Motivation

Ai Miyamoto, Julian Seuring, Cornelia Kristen

Abstract. Despite their often-reported tendency to "aim high," children of immigrants frequently demonstrate lower school achievement than children of non-immigrants. We address this attitude-achievement paradox by proposing a conditional view that contends that exposure to the destination country's language is essential for transforming favourable educational orientations into achievement. Based on German data from the National Educational Panel Study (NEPS), we study the role of educational attitudes in terms of both psychological measures of academic motivation and sociological measures of educational aspirations. The attitude-achievement paradox is reflected in a weaker link between educational orientation and reading achievement among students from certain migrant groups in comparison to their majority peers. Regarding the sources of these discrepancies, we find that immigrant students who use the destination language in their everyday interactions experience greater benefits from higher levels of academic motivation and educational aspirations than do those with less exposure to the language. In this way, we can account for some of the observed group differences in the link between educational attitudes and achievement and, thus, for part of the attitude-achievement paradox.

1. Introduction

An important notion that has frequently been emphasized in the sociological literature is that immigrant parents and immigrant students[1] have higher educational aspirations than the majority population. Rather than reflecting a uniform pattern, a closer look at the available empirical work reveals that there is variation across immigrant groups and that many studies observe higher aspirations only after considering social origin and/or prior achievement. Given this important qualification, a favourable pattern emerges for certain migrant groups across a range of European and North American destinations (e.g., for Belgium: D'Hondt et al. 2016; Teney, Devleeshouwer and Hanquinet 2013; for France: Brinbaum and Cebolla-Boado 2007; for Germany: Dollmann 2017; Salikutluk 2016; Stanat, Segeritz and Christensen 2010; for the United States: Bates and Anderson 2014; Hao and Bonstead-Bruns 1998).

Immigrant students' academic motivation has received less attention than their aspirations. Empirical studies on this facet of educational orientation distinguish mostly between migrants and the majority population rather than considering specific migrant groups. In addition, these contributions usually refer to a broader range of measures that capture various aspects of academic motivation. Despite this variation, the findings point primarily to similar or higher values for immigrants in comparison to majority students on measures of intrinsic, extrinsic and instrumental motivation; additionally, expectancies of success seem to be greater among students of migrant origin (e.g., for Germany: Kigel, McElvany and Becker 2015; Miyamoto, Pfost and Artelt, 2018; Stanat, Segeritz and Christensen 2010; for the Netherlands: Thijs 2011; Pat-El, Tillema and Van Koppen 2012; for Switzerland: Villiger, Wandeler and Niggli 2014; for the United States: Fan, Williams and Wolters 2012; Fuligni 1997).

Despite this tendency to aim high in terms of either educational aspirations or academic motivation, children and youth of migrant origin often demonstrate lower achievement in school – this is a puzzling phenomenon that has been named the "attitude-achievement paradox" (Mickelson 1990) or the "aspiration-achievement paradox" (Hill and Torres 2010).

In this article, we address this attitude-related discrepancy across groups by proposing a conditional view. In other words, to transform higher levels of either academic

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[1] When referring to immigrant students, we consider both individuals who were born in a different country and those who were born in the destination country but whose parents were born abroad.

motivation or educational aspirations into achievement, children and youth of migrant origin must have access to environments that provide favourable conditions for learning. An important condition that seems to be particularly relevant for immigrant students' language-related achievement is the opportunity to communicate in the language of instruction in everyday interactions. Thus, immigrant students who are exposed to the language of the destination country on a regular basis should be better equipped to transform their strong determination into academic achievement than should those with less exposure.

We expect to find this relationship for different forms of orientations towards education, and therefore, we consider both sociological and psychological conceptualizations of educational attitudes. We examine these concepts and illustrate their similarities and differences and thus bring together ideas that are usually studied separately under their respective disciplinary umbrellas.

Based on a general learning model (Chiswick and Miller 1995, 2001), we show how students' academic motivation and educational aspirations can be linked to school achievement. An extended version of the model also allows us to capture the idea that learning opportunities within the environment, such as those exposing students to the destination language, moderate the relationship between educational orientations and achievement. This conditional view could play a pivotal role in accounting for the attitude-achievement paradox.

The empirical study is based on a sample of immigrant and majority students in Germany, one of the major immigrant-receiving countries in Europe. Using data from the National Educational Panel Study (NEPS), we focus on the reading achievement of ninth-grade students. Although reading achievement is key to success in the educational system and the labour market, immigrants frequently encounter difficulties in this domain. The large sample size (N=14,981) allows us to distinguish between different migrant groups (i.e., students from families of Turkish origin, of Polish origin and from the former Soviet Union) and to compare them to their peers from the majority population.

2. Educational aspirations and academic motivation

In the sociological literature on education and social inequality, educational aspirations refer to "orientations composed of specific beliefs about one's future trajectory through the educational system" (Morgan 2006, 1528-1529). These aspirations have also been described as "the cognitive orientational aspect of goal-directed behavior" (Haller

1968, 484). An important distinction is commonly made between idealistic and realistic aspirations (Lewin 1939, Haller 1968). Idealistic aspirations indicate what a person hopes or desires to attain. While an idealistic aspiration can be detached from restrictions and prior experiences, this is not the case for realistic aspirations, which are also called expectations. Realistic aspirations refer to what a person believes he or she can attain.

Most of the measures typically implemented in empirical studies do not reflect this distinction but rather utilize the same operationalization for both concepts (Morgan 2006). In the tradition of the Wisconsin model of status attainment, for example, typical questions refer to students' plans to go to college (e.g., Sewell, Haller and Portes 1969; Sewell, Haller and Ohlendorf 1970). Other studies have similarly asked about the highest academic degree the respondent intends to obtain (e.g., Drew and Astin 1972). Work that adequately captures both concepts is rare, but there are studies clearly directed towards either realistic (e.g., Jencks, Crouse and Mueser 1983; Kerckhoff and Huff 1974) or idealistic (e.g., Marjoribanks 1997; Picou and Carter 1976; Wentzel 1998) aspirations. The NEPS data used in the current study provide the opportunity to consider both concepts, as the data include measures that have been explicitly designed to reflect this distinction.

In psychology, expectancy-value models of achievement focus on students' academic motivation in terms of two components: expectancies of future success and task values (Eccles at al. 1983; Eccles and Wigfield 2002). Expectancies of success refer to beliefs about how well one will do on an upcoming task (Eccles and Wigfield 2002, 110). These expectancies are assumed to be influenced by individuals' academic self-concepts and thus by their knowledge and perceptions of themselves in achievement situations (Bong and Skaalvik 2003, 10). One's perceived competence in a specific domain is usually measured by a set of items addressing subject-related ability beliefs (in the NEPS data, e.g., "I learn fast in German"). While future expectancies of success on a certain task can be distinguished from evaluations of one's present competence in a given domain, these two concepts are difficult to disentangle empirically (Eccles and Wigfield 2002).

Task values, the second component of academic motivation, capture the incentives or reasons individuals have to engage in an activity (Eccles and Wigfield 2002, 112). Within the expectancy-value framework, four components of task values are distinguished: attainment value, intrinsic value, utility value and perceived costs (Eccles et al. 1983; Eccles and Wigfield 2002). Attainment value refers to how

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important it is for a person to perform well on a given task. Intrinsic value is the enjoyment related to the activity; it also represents the individual's interest in the subject. Utility value refers to how useful a person believes performing the task will be in accomplishing a future goal. This component captures the instrumental or extrinsic reasons for engaging in an activity. Finally, performing a task induces costs, such as the amount of time or effort it takes to succeed or the opportunity costs associated with engaging in one task over another. Typical measurements of these costs include a series of items on each value component (e.g., Battle and Wigfield 2003). Based on the NEPS data, we focus on intrinsic value, which is based on items regarding reading-related interest (e.g., "I enjoy reading and writing texts").

Educational aspirations and academic motivation reflect cognitive orientations relevant to individuals' behaviour and share a temporal component, as they assume that orientations are rather stable over time (Bong and Skaalvik 2003; Morgan 2006) and consider expectations about the future. Although both concepts are used to study educational outcomes, the notions underlying them differ: While educational aspirations are directed towards educational attainment in terms of completing a certain degree, academic motivation is more closely linked to performance in a certain domain and, thus, to achievement.

3. Immigrant students in the German school system

Over time, the population of immigrant students in the German school system has risen in volume and has become more diverse regarding the regions of origin and their families' migration motives. The country's current student composition reflects crucial phases of Germany's post-war immigration history in the 20th century.

An important group of students includes children of labour migrants from Southern Europe and Turkey who were recruited in the late 1950s and thereafter to fill shortages in the lower-qualified segments of the labour market. Subsequent family migration continued after the recruitment period ended in 1973. Currently, students of Turkish origin make up one of the largest immigrant groups in the German school system (Gresch and Kristen 2011; Olczyk et al. 2016).

In the 1990s, following the fall of the Iron Curtain, the so-called "(Spät-) Aussiedler" altered the composition of the migrant population. Due to their German ancestry, migrants received citizenship upon arrival and were eligible for state assistance to support their social and economic integration (Haberfeld et al. 2011). Most of these migrants came from territories of the former Soviet Union (FSU), while

many others migrated from other Eastern European countries. Most of the FSU students in our study belong to this group of "(Spät-) Aussiedler". Together with those of Turkish origin, these students currently constitute the numerically most important migrant group in the German school system (Gresch and Kristen 2011; Olczyk et al. 2016). Their parents' qualification levels are more favourable than those of Turks: about half have acquired a post-secondary or tertiary degree (Kogan 2011).

A third important development is related to internal migration within the European Union in the aftermath of the area's substantive enlargement in 2004. In that year, a number of Eastern European countries, including Poland, joined the European Union. Migration from Poland and from other Eastern European countries continues to be important and could further change the student body in the near future. Recent Polish migrants seem to be well educated; many have acquired a tertiary degree (Kristen, Mühlau and Schacht 2016; Will 2016).

In the stratified German school system, after the completion of primary education, students enter one of various secondary tracks that differ in length and curricula. Students in the ninth grade, the population on which we focus in our empirical study, still attend one of these tracks, with some of them doing so in the last year of their general education. On average, immigrant students show lower achievements in German secondary schools. However, performance substantively differs across migrant groups, even after taking social origin into account: while ninth-grade second-generation students of Turkish origin achieve significantly lower scores in reading than the majority, this is not the case for second-generation migrants from Poland and the FSU (Stanat, Rauch and Segeritz 2010).

4. Theoretical considerations

Achievements in school at any given point in time can be perceived to be the result of various preceding learning investments in skill-increasing behaviours (Esser 2006a; 2006b). According to this view, investments do not necessarily have to be made consciously; they can also be a by-product of other activities that are not explicitly aimed at the acquisition of new competences. Reading a book, for example, might be done for pleasure; at the same time, as a language-related activity, it can add to an individual's vocabulary and provide access to new knowledge.

In the following, we refer to a general model of learning that has previously been applied to different outcomes and across disciplines. According to this model, learning investments can be expected to differ across individuals and groups,

depending on the incentives associated with learning, the degree of exposure to various learning environments and the efficiency with which individuals acquire new skills per unit of exposure (Chiswick and Miller 1995, 2001). Now, our task is to illustrate how educational aspirations and academic motivation enter the picture and then to determine the implications of these orientations for the achievements of students of migrant origin in comparison to their majority peers.

Given that achievement in language-related tasks is more challenging for immigrant students – who often grow up speaking a different language at home – we illustrate our reasoning by focusing on reading achievement, a crucial aspect of students' performance in school. Reading also plays an important role in learning more generally, as learning processes strongly rely on written material (Schiefele et al. 2012).

Within the framework of the learning model, both educational aspirations and academic motivation can be connected to the construct of "incentives". Students who aim to complete a higher educational degree in the future will usually know that achievement is a necessary precondition for obtaining this qualification. Accordingly, as a strategy to realize their goals, students with high aspirations should have a greater inclination to invest in learning-related activities, thus increasing their achievements. A more realistic take on actual opportunities and abilities – such as taking prior performance into account – should manifest in a closer relationship between realistic aspirations and achievement than between idealistic aspirations and achievement.

In contrast to educational aspirations, academic motivation is perceived to be domain-specific; therefore, motivation in a given realm can be connected in a straightforward manner to investments and eventual performance in that domain. Higher levels of academic motivation should serve as an incentive to self-select into activities that provide favourable conditions for learning and thereby contribute to achievement. Apparently, the consequences of engaging in certain activities can be linked to other components of the learning model – particularly to exposure. However, incentives come first in the sense that they stimulate individuals to engage in certain behaviours that provide opportunities that benefit learning.

To further illustrate this reasoning, we refer to the two motivational constructs that we consider in the empirical study, that is, students' academic self-concept, which involves shaping expectancies of future success, and subject-related interest, which reflects the intrinsic value of engaging in a certain task. The first argument linking academic motivation to learning investments is that students who view themselves as

capable of academic success in a certain domain may be inclined to work harder and therefore perform better (Kurtz-Costes and Schneider 1994). Hence, positive beliefs about one's abilities are expected to influence the efforts put into performing a task. The second strand of reasoning on the relevance of subject-related interest for achievement refers to a set of behaviours and preferences that benefit learning. Taking reading as an example, the literature argues that a person who is intrinsically interested in reading tends to spend more time reading, uses more effective reading strategies and prefers more challenging reading materials than those who are less interested in reading (Schiefele et al. 2012). Interest should also increase a reader's attention and result in the reader engaging in deeper information processing (Hidi 2001). These processes can be assumed to positively contribute to students' reading competence.

Taken together, psychological and sociological arguments point to a positive relationship between students' educational orientations and reading achievement. This link might be more pronounced in the case of motivation than in the case of aspirations, as the content of the former seems to be more closely connected to achievement in a certain domain, while the content of the latter is focused on educational attainment.

Moreover, the processes outlined above are expected to apply to all students similarly. Still, for immigrant students, the strength of these links might be weaker, suggesting that they may find it more difficult to benefit from higher levels of educational aspirations or academic motivation; this phenomenon contributes to the attitude-achievement paradox.

To transform favourable orientations into achievement, it is essential to have access to learning environments that provide the opportunity to communicate in the language of instruction in everyday interactions. In the general learning model, this reasoning is related to the construct of exposure. The idea behind this concept is that compared to those with less exposure, immigrant students who are exposed to the language of the destination country on a regular basis should have better opportunities to transform higher levels of motivation and aspirations into academic achievement. Therefore, rather than proposing an additive influence of exposure and incentives on competence development, as put forward in the original learning model (Chiswick and Miller 1995; 2001), this view emphasizes a multiplicative relationship between the two factors, according to which exposure is a necessary condition for incentives to effectively promote learning (Esser 2006a; 2006b).

Considering exposure to the language of instruction may prove crucial in accounting for variation in the relationship between orientations and achievement across immigrant groups. For example, individuals of Turkish origin are known for their relatively frequent use of their language of origin at home in comparison to other groups, such as immigrants and their descendants from Poland or the FSU (Strobel and Seuring 2016). Consequently, students from Turkish families might experience fewer benefits from higher levels of academic motivation and educational aspirations.

5. Data and methods
5.1. Data
The empirical analyses are based on data from the NEPS (Blossfeld, Roßbach and Maurice 2011).[2] We focus on ninth-grade students who were surveyed in fall/winter 2010/2011 and in spring 2011. In the data collections, different domains were tested, and self-administered questionnaires with divergent contents were completed. This information can be combined into a cross-sectional dataset.

The stratified multistage sampling design of ninth graders consists of a random selection of schools from different secondary school types; within the selected schools, students from one or two classes participated (Skopek, Pink and Bela 2013). From the initial sample (N=16,425), we include students with available questionnaire information in at least one wave (N=16,254). Moreover, we consider ninth graders who attended one of the regular school tracks, thus dropping students from special needs schools (N=1,155) and from Waldorf Schools (N=118). We further exclude cases with missing information on the country of birth, yielding a sample of 14,872 individuals for analysis.

5.2. Variables
Reading achievement is measured by a standardized German reading comprehension test that was developed within the NEPS (Gehrer et al. 2012). The test is based on five

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[2]   Starting Cohort Grade 9, doi:10.5157/NEPS:SC4:9.0.0. From 2008 to 2013, NEPS data were collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). Beginning in 2014, NEPS has been carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

different texts of approximately 200 to 550 words each. Respondents are asked to complete a set of multiple-choice questions that capture different types of tasks, such as finding information, drawing text-related conclusions or reflecting on the content of the text. The resulting test instrument consists of 31 items. The test scores are included as weighted likelihood estimates (WLE; Pohl and Carstensen 2012), and the test showed good reliability (Cronbach's alpha=0.747; Haberkorn et al. 2012).

Students of migrant origin come from families with at least one parent or at least two grandparents born abroad, including individuals up to the so-called 3.5[th] generation (Kristen, Olczyk and Will 2016).[3] Based on the country of origin of the student's parents or grandparents, it is possible to further distinguish between different groups (i.e., Germany, Turkey, FSU, Poland and other countries). We also consider whether students were born abroad (=1) or born in the destination country (=0).

Educational orientations reflect the incentives to engage in activities relevant to learning. On the sociological side, we analyse two questions on educational aspirations, which refer to the highest school-leaving certificate the student wishes or expects to achieve. While wishes reflect idealistic aspirations ("Regardless of which school you go to and how good your grades are, what kind of school-leaving certificate would you like to have?"), expectations refer to realistic aspirations ("Considering everything you know now, what qualification will you actually leave school with?"). For both questions, we can distinguish between low ("Hauptschule or less"), medium ("Mittlere Reife") and high ("Abitur") educational aspirations.

On the psychological side, we consider academic motivation in terms of students' linguistic self-concept and their subject-related interest. The measure of the former is based on the average of three items that capture the individual's perception of his or her general performance in the school subject of German (e.g., "I learn fast in German" or "I get good grades in German"; Cronbach's alpha=0.827). The latter is based on the average of 4 items that reflect the person's interest in the German language and in reading and literature (e.g., "I enjoy reading and writing texts" or "It means a lot to me to become more familiar with the German language and literature"; Cronbach's alpha=0.831). Values for both variables range from 1 ("Does not apply") to 4 ("Applies completely").

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3   When running the analyses with a narrower definition of migrant origin based on individuals only up to the 2.5[th] generation (i.e., with at least one parent born abroad), the results do not change.

Exposure to the destination language is demonstrated in the student's language use at home. Individuals who claimed to have learned a language other than German at home were asked to indicate the language they spoke with their parents. The values of these two variables range from 1 ("only the other language") to 4 ("only German"). Combining this information yields a composite measure of German language use with parents. Majority students and those who have not learned another language at home are coded as speaking "only German" (=4) at home.

As a measure of efficiency, we use students' general cognitive ability. Similar to Raven's Matrices Test, the instrument implemented in the NEPS is based on matrices that measure nonverbal reasoning (Haberkorn and Pohl 2013). The test includes three sets with four items each, totalling up to 12 items (Cronbach's alpha=0.680). We calculate the sum score of the number of correctly solved items.

As controls, we further consider the school track attended in the stratified German secondary school system. The lowest track is the "Hauptschule", followed by the medium track "Realschule" and the highest track "Gymnasium". We also assign those in the comprehensive school type "Gesamtschule" to one of the three tracks if the school differentiates between tracks. If the school does not identify tracks or if the track attended in this school type is unknown, students are assigned to the category "Gesamtschule".

Moreover, we include gender and age (in years). Socioeconomic characteristics are captured with additional variables. The first is parental education, measured as the highest degree attained by the mother or the father. We distinguish between low ("no degree, Hauptschule"), medium ("Mittlere Reife") and high ("Abitur") educational attainment. In a similar manner, we can include the highest occupational status reached by the mother or the father based on the International Socio-Economic Index of Occupational Status (ISEI; Ganzeboom 2010). Finally, we also consider the number of books in the home; the variable ranges from 0 ("0-10") to 5 ("more than 500"). In the analyses, this variable is treated as continuous. Table 1 illustrates the distributions of the different variables according to migrant origin.

5.3. Methods

We use OLS regression to model differences in reading achievement. To account for the clustered sample structure (i.e., students nested in schools), we consider robust standard errors (Huber 1967; White 1982).

For the multivariate analyses, all continuous variables are standardized (mean=0, sd=1). The regression coefficients of these continuous variables can therefore be interpreted as standardized beta coefficients. That is, a one-standard-deviation increase in x_i refers to a change in the dependent variable of $ß_i$ standard deviations. Coefficients of categorical variables specify the mean differences in test scores between two groups. A coefficient of 0.2 for gender, for instance, would indicate that female students outperform male students by 0.2 standard deviations on average.

In the multivariate account, we deal with missing values by employing multiple imputation (e.g., Allison 2001). Accordingly, we run regression models for each of the 50 imputed datasets and then combine the estimates following Rubin's (1987) rule. Note that the descriptive results presented in Table 1 are based on the original data without imputation. We report unweighted results for both the descriptive and the multivariate analyses. Robustness checks using sample weights yield analogous results. All analyses are conducted with the statistical software package Stata (Version 14.2; StataCorp 2015).

6. Results

6.1. Descriptive results

Table 1 displays the distributions of the different variables included in our study for the different immigrant groups and for the reference population without a migration background separately. The findings on reading achievement are in line with previous research, according to which majority students outperform immigrant students. Additionally, a familiar picture emerges within the migrant population, with students of Turkish origin showing the lowest achievement, followed by students of FSU and Polish origins.

Regarding our first set of incentive variables, we observe that immigrant students' educational aspirations – whether realistic or idealistic– do not exceed those of majority students. While the distributions for idealistic and realistic aspirations are similar for Polish and majority students, ninth graders of Turkish and FSU origin display considerably lower aspirations. These differences from the majority are especially pronounced for realistic aspirations, which may reflect students' accurate judgement of their lower reading achievements.

In additional analyses (not presented here), we examine how these patterns change once we take social origin into account. The findings point to significantly

higher idealistic and realistic aspirations in the Turkish group, to higher idealistic aspirations among children of Polish migrants than among the majority, and to lower realistic aspirations among FSU students. These observations are in line with previous research, which has frequently shown that patterns of higher aspirations exist only for some migrant groups and often appear only after considering migrants' social origin and/or prior skills.

Regarding academic motivation, the bivariate results presented in Table 1 show that self-concept is significantly lower among students of Turkish and FSU origins but similar for Polish and majority students. As before, this finding may reflect individuals' realistic grasp on their actual performance as measured by test scores. The situation differs for subject-related interest: despite lower achievements, students of Turkish origin demonstrate higher values on this measure than all other groups, including the majority.

6.2. Multivariate results

In a next step, we use OLS regression to model differences in reading achievement. We proceed in a stepwise manner, beginning with a base model that captures the three constructs of the general learning model (see Table 2, Model 1). The findings are in line with previous research in that they show that incentives, efficiency, and – above all – exposure are relevant for reading achievement. All coefficients point in the expected direction, including our key variables on educational aspirations and academic motivation. In this initial model, significant differences from the majority in terms of achievement remain only for students of Turkish origin.

In the next step, we address the attitude-achievement paradox by investigating the link between educational orientations and reading achievement. Based on the notion that immigrant students may find it more difficult to translate positive educational attitudes into favourable academic outcomes, we expect the link to be weaker for immigrant students than for the majority. We study this notion in a sequence of models for interactions between migrant origin and each of the incentive variables (Models 2a-2d).

The findings clearly support our assumption for academic motivation (Models 2c and 2d). That is, students of Turkish and FSU origins hardly benefit from higher levels of motivation than the German majority, who profit from these motivational forces. For example, for Turkish students' self-concept, we observe only a small positive effect of (0.09-0.07=) 0.02 compared to 0.09 for students from the majority

population. Similarly, for this migrant group's subject-related interest, the positive influence on achievement amounts to only (0.10-0.09=) 0.01, in comparison to 0.10 for German students. The results for ninth graders of FSU origin very much resemble those of the Turkish group. Only for students of Polish origin do these links appear to be similar to those for the majority.

In contrast, the analyses on educational aspirations provide less support for the idea of a weaker relationship (Models 2a and 2b). We do not observe any group differences in the link between realistic aspirations and reading achievement, and the same largely applies to idealistic aspirations. The only exception pertains to students of Turkish origin, who are clearly at a disadvantage. In this group, medium or high idealistic aspirations do not positively influence achievement; rather, quite the contrary is true. Subtracting the interaction coefficients from the conditional main effects on idealistic aspirations produces a negative value (for medium aspirations, 0.17-0.28 = -0.11 compared to 0.17 for the majority; for high aspirations, 0.28-0.35 = -0.07 compared to 0.28 for the majority). In other words, while all other groups profit from greater idealistic aspirations, students of with a Turkish background do not.

With the next set of analyses, we address the reasoning that exposure is essential for transforming favourable educational attitudes into successful outcomes. Accordingly, we introduce additional interactions between language use, our measure of exposure, and incentives in terms of both educational aspirations (Table 3) and academic motivation (Table 4). Because we focus on language use at home, we can include only immigrant students in this step of analysis.

For each of the educational orientation variables, we estimate two models. The first set of models (Models 3a and 4a in Table 3; Models 5a and 6a in Table 4) includes the same variables as those shown in Table 2. The only difference is that these additional regressions refer to the subsample of immigrants instead of the complete sample. In addition, the second set of models covers the multiplicative relationship between incentives and exposure (Models 3b and 4b in Table 3; Models 5b and 6b in Table 4). Apart from our substantive interest in the interaction itself, the comparison between the two sets of models enables us to examine whether the inclusion of the interaction term changes the initially observed group differences in the link between educational attitudes and achievement.

According to the initial models of aspirations, we initially observe hardly any significant group differences in the association between aspirations and achievement (see Models 3a and 4a). The only exception pertains to students with a Turkish

background, for whom the link between idealistic aspirations and achievement is weaker than that for students of Polish and FSU origins. This observation is in line with our findings from the preceding analysis step, where the relationship observed for the Turkish group differed not only from that for the majority but also from those for the other migrant groups (Model 2a in Table 2).

The most important finding of this analysis, however, concerns the significant positive interaction between exposure and high realistic aspirations (Model 4b, Table 3). This interaction indicates that students who use the destination language in their everyday interactions benefit more from higher realistic aspirations. The idea that exposure matters in mobilizing the advantages associated with positive educational attitudes receives further support in the analyses of academic motivation. In these regressions, we find significant positive interactions between destination language use and both motivational constructs (Models 5b and 6b in Table 4). This result also underpins the notion that students who use the destination language on a regular basis are more successful in translating their academic motivation into favourable learning outcomes.

Furthermore, after considering the multiplicative influence of exposure and subject-related interest, the initially weaker link between academic motivation and achievement observed for students of Turkish and FSU origins compared to ninth graders with a Polish background is considerably reduced, and the remaining differences are no longer statistically significant. This finding suggests that the attitude-achievement paradox is at least partially driven by differences in exposure.

7. Discussion

Despite their often-reported tendency to aim high, children of immigrants frequently show lower achievements in school, a phenomenon that has been called the attitude-achievement paradox (Mickelson 1990). In our study, this paradox manifested in a weaker link between academic motivation and reading achievement among students of Turkish and FSU origins compared to their majority peers. Turkish youth also profited less from their greater idealistic aspirations than all other groups. We addressed the sources of these discrepancies by proposing a conditional view according to which exposure is essential for transforming favourable educational orientations into successful outcomes in school. In line with this notion, we found that immigrant students who used the destination language in their everyday interactions benefited more from higher levels of academic motivation and realistic aspirations than

those with less exposure. In this way, we could account for some of the observed group differences in the link between educational attitudes and achievement and thus for part of the attitude-achievement paradox.

Overall, the empirical support for our arguments was stronger for the psychological measures of academic motivation than for the sociological measures of educational aspirations. This finding applies to both the weaker link between educational orientations and reading achievement (i.e., the paradox) and the role of language exposure as a moderator of this relationship. These differential findings might be related to the contents of the respective measurements: whereas the motivational indicators are domain-specific and explicitly address the destination language (e.g., "I enjoy reading and writing texts"), the aspirational indicators focus on educational attainment in terms of completing a certain degree.

Moreover, one could argue that the seemingly close connection between language use and reading achievement may have driven the results on the multiplicative relationship between incentives and language exposure. To check for the robustness of these findings, in additional analyses (not presented here), we considered students' achievement in maths instead of reading. In line with the findings on reading achievement, the results on maths pointed to a weaker link between educational orientations and achievement for students of Turkish and FSU origins and provided further evidence on the moderating role of language use. Our argument thus remains unchanged.

In addition to measuring the language used with the respondents' parents, the NEPS data include a variety of measures on language exposure in everyday interactions, such as language use with peers or siblings. Similar findings emerged when considering these measures as single items and in a combined indicator. For this reason and because language use with parents has been shown to be more important for achievement than other forms of language exposure (Strobel and Seuring 2016), we selected this measure for our analysis.

Moreover, our analyses are based on cross-sectional data and are therefore limited in their causal scope. An important problem concerns the possibility of a reciprocal relationship between our key constructs. That is, achievements may influence the formation of academic motivation and educational aspirations and vice versa (e.g., Morgan and Fuchs 2007). A thorough assessment of these potential sources of bias requires the use of longitudinal data.

Finally, we argue that the general reasoning regarding the multiplicative relationship between incentives and exposure can also be applied to other facets of exposure. Even though we consider language use an important condition, exposure may more generally stand for the degree of incorporation of immigrant parents and their offspring into the host society. For example, immigrants who have ties to members of the majority population might be able to make better use of their elevated educational orientations because their inter-ethnic contacts provide relevant information and thus allow for a successful navigation of the educational system. In this sense, exposure encompasses more than simply opportunities to communicate in the destination language. Accordingly, the unexplained parts of the attitude-achievement paradox may be related to other types of exposure.

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Table 1: Descriptive statistics

	Majority N=10,542		Turkey N=831		Poland N=443		FSU N=718		Other N=2,338		Total N=14,872		% Missing
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
Reading achievement	0.13	(1.23)	-0.97*	(1.14)	-0.13*	(1.20)	-0.45*	(1.16)	-0.26*	(1.28)	-0.02	(1.26)	7.7
Born abroad (%)	0.0		11.1*		17.4*		49.9*		17.8*		6.3		0.0
Incentives													
Idealistic aspirations (%)													6.5
low	5.1		5.9		5.3		5.9		6.3*		5.3		
medium	35.7		41.9*		32.2		45.2*		34.8		36.2		
high	59.3		52.2*		62.5		49.0*		58.9		58.4		
Realistic aspirations (%)													7.8
low	14.2		28.9*		18.7*		23.0*		19.3*		16.4		
medium	44.5		44.5		43.4		53.7*		44.1		44.9		
high	41.3		26.6*		37.9		23.3*		36.5*		38.8		
Self-concept	2.95	(0.62)	2.87*	(0.63)	2.91	(0.69)	2.80*	(0.61)	2.94	(0.63)	2.93	(0.62)	5.7
Subject-related interest	2.20	(0.79)	2.41*	(0.78)	2.15	(0.77)	2.19	(0.75)	2.32*	(0.80)	2.23	(0.79)	9.9
Exposure													
Language use at home	4.00	(0.00)	2.33*	(0.82)	3.23*	(1.00)	2.55*	(0.97)	3.11*	(0.99)	3.70	(0.72)	3.3
Efficiency													
Cognitive ability	8.88	(2.35)	7.21*	(2.59)	8.43*	(2.56)	8.28*	(2.49)	8.27*	(2.63)	8.65	(2.46)	7.6
Controls													
School track (%)													0.0
Hauptschule	22.5		49.5*		24.8		44.4*		35.3*		27.1		
Realschule	31.8		20.8*		32.7		31.2		24.5*		30.0		
Gymnasium	40.0		19.0*		34.5*		20.5*		33.4*		36.7		
Gesamtschule	5.8		10.7*		7.9		3.9*		6.8		6.2		
Female (%)	49.3		48.4		55.1*		51.6		51.3		49.8		0.1
Age	15.10	(0.59)	15.36*	(0.68)	15.21*	(0.60)	15.46*	(0.73)	15.26*	(0.70)	15.16	(0.63)	2.6
Parental education (%)													21.6
low	12.3		46.8*		13.5		7.5*		18.8*		14.8		
medium	42.3		32.2*		32.7*		45.7		31.8*		40.1		
high	45.4		21.0*		53.9*		46.8		49.4*		45.1		
Occupational status (ISEI)	52.94	(20.13)	37.04*	(18.06)	47.41*	(19.93)	40.82*	(19.32)	49.16*	(21.47)	51.01	(20.61)	21.8
Number of books	2.98	(1.44)	1.83*	(1.28)	2.47*	(1.41)	2.20*	(1.35)	2.46*	(1.55)	2.78	(1.48)	5.2

Note: * Significant differences between immigrant and majority students (p<0.05).

Table 2: OLS regressions for reading achievement

	Model 1			Model 2a			Model 2b			Model 2c			Model 2d		
Migrant origin (ref. Germany)															
Turkey	-0.27	***	(0.04)	0.03		(0.12)	-0.18	**	(0.06)	-0.27	***	(0.04)	-0.25	***	(0.04)
Poland	0.01		(0.04)	-0.11		(0.17)	0.11		(0.08)	0.01		(0.04)	0.01		(0.04)
FSU	0.03		(0.04)	0.05		(0.13)	0.02		(0.07)	0.02		(0.04)	0.03		(0.04)
Other	-0.05	*	(0.02)	-0.06		(0.07)	-0.01		(0.05)	-0.05	*	(0.02)	-0.05	*	(0.02)
Born abroad	-0.03		(0.03)	-0.03		(0.03)	-0.04		(0.03)	-0.04		(0.03)	-0.03		(0.03)
Incentives															
Idealistic aspirations (ref. low)															
medium	0.17	***	(0.03)	0.17	***	(0.04)	0.16	***	(0.03)	0.17	***	(0.03)	0.17	***	(0.03)
high	0.26	***	(0.04)	0.28	***	(0.04)	0.25	***	(0.04)	0.26	***	(0.04)	0.26	***	(0.04)
Realistic aspirations (ref. low)															
medium	0.11	***	(0.02)	0.11	***	(0.02)	0.13	***	(0.03)	0.11	***	(0.02)	0.11	***	(0.02)
high	0.30	***	(0.03)	0.30	***	(0.03)	0.33	***	(0.04)	0.30	***	(0.03)	0.30	***	(0.03)
Self-concept	0.08	***	(0.01)	0.08	***	(0.01)	0.08	***	(0.01)	0.09	***	(0.01)	0.08	***	(0.01)
Subject-related interest	0.09	***	(0.01)	0.09	***	(0.01)	0.09	***	(0.01)	0.09	***	(0.01)	0.10	***	(0.01)
Exposure															
Language use at home	0.07	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)
Efficiency															
Cognitive ability	0.24	***	(0.01)	0.24	***	(0.01)	0.24	***	(0.01)	0.24	***	(0.01)	0.24	***	(0.01)
Controls															
School track (ref. Hauptschule)															
Realschule	0.24	***	(0.03)	0.25	***	(0.03)	0.24	***	(0.03)	0.24	***	(0.03)	0.24	***	(0.03)
Gymnasium	0.54	***	(0.03)	0.54	***	(0.03)	0.54	***	(0.03)	0.54	***	(0.03)	0.54	***	(0.03)
Gesamtschule	0.18	***	(0.04)	0.18	***	(0.04)	0.18	***	(0.04)	0.18	***	(0.04)	0.18	***	(0.04)
Female	0.12	***	(0.01)	0.12	***	(0.01)	0.12	***	(0.01)	0.12	***	(0.01)	0.12	***	(0.01)
Age	-0.05	***	(0.01)	-0.05	***	(0.01)	-0.05	***	(0.01)	-0.05	***	(0.01)	-0.04	***	(0.01)
Parental education (ref. low)															
medium	-0.07	**	(0.02)	-0.07	**	(0.02)	-0.07	**	(0.02)	-0.07	**	(0.02)	-0.07	**	(0.02)
high	-0.08	**	(0.03)	-0.08	**	(0.03)	-0.08	**	(0.03)	-0.08	**	(0.03)	-0.08	**	(0.03)
Occupational status (ISEI)	0.02	*	(0.01)	0.02	*	(0.01)	0.02	*	(0.01)	0.02	*	(0.01)	0.02	*	(0.01)
Number of books	0.09	***	(0.01)	0.09	***	(0.01)	0.09	***	(0.01)	0.09	***	(0.01)	0.09	***	(0.01)

Migrant origin* incentives

	Model 1	Model 2	Model 3	Model 4	Model 5
Migrant origin*Idealistic aspirations					
Turkey*medium		-0.28 * (0.12)			
Turkey*high		-0.35 ** (0.13)			
Poland*medium		0.10 (0.18)			
Poland*high		0.14 (0.18)			
FSU*medium		0.03 (0.14)			
FSU*high		-0.06 (0.14)			
Other*medium		0.07 (0.08)			
Other*high		-0.02 (0.08)			
Migrant origin*Realistic aspirations					
Turkey*medium			-0.09 (0.07)		
Turkey*high			-0.14 (0.09)		
Poland*medium			-0.15 (0.10)		
Poland*high			-0.11 (0.10)		
FSU*medium			0.05 (0.08)		
FSU*high			-0.03 (0.09)		
Other*medium			-0.03 (0.05)		
Other*high			-0.07 (0.06)		
Migrant origin*Self-concept					
Turkey				-0.07 * (0.03)	
Poland				0.05 (0.04)	
FSU				-0.08 ** (0.03)	
Other				-0.02 (0.02)	
Migrant origin*Subject-related interest					
Turkey					-0.09 ** (0.03)
Poland					0.01 (0.04)
FSU					-0.10 ** (0.03)
Other					-0.01 (0.02)
R^2	0.44	0.44	0.44	0.44	0.44

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$; robust standard errors in parentheses; N=14,872.

Table 3: OLS regressions for reading achievement

	Model 3a			Model 3b			Model 4a			Model 4b		
Migrant origin (ref. Poland)												
Turkey	0.16		(0.21)	0.15		(0.21)	-0.30	**	(0.10)	-0.33	***	(0.10)
FSU	0.16		(0.21)	0.16		(0.22)	-0.10		(0.10)	-0.13		(0.11)
Other	0.06		(0.18)	0.06		(0.18)	-0.12		(0.09)	-0.13		(0.09)
Born abroad	-0.04		(0.03)	-0.04		(0.03)	-0.04		(0.03)	-0.04		(0.03)
Incentives												
Idealistic aspirations (ref. low)												
medium	0.28		(0.18)	0.28		(0.18)	0.17	**	(0.05)	0.17	**	(0.05)
high	0.45	*	(0.18)	0.44	*	(0.18)	0.22	***	(0.06)	0.23	***	(0.06)
Realistic aspirations (ref. low)												
medium	0.09	*	(0.04)	0.09	*	(0.04)	-0.01		(0.10)	-0.02		(0.10)
high	0.28	***	(0.05)	0.28	***	(0.05)	0.25	*	(0.11)	0.22	*	(0.11)
Self-concept	0.07	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)
Subject-related interest	0.08	***	(0.01)	0.08	***	(0.01)	0.07	***	(0.01)	0.07	***	(0.01)
Exposure												
Language use at home	0.11	***	(0.02)	0.10		(0.05)	0.11	***	(0.02)	0.06	*	(0.03)
Efficiency												
Cognitive ability	0.26	***	(0.01)	0.26	***	(0.01)	0.26	***	(0.01)	0.26	***	(0.01)
Controls												
School track (ref. Hauptschule)												
Realschule	0.29	***	(0.04)	0.29	***	(0.04)	0.29	***	(0.04)	0.29	***	(0.04)
Gymnasium	0.60	***	(0.06)	0.60	***	(0.06)	0.60	***	(0.06)	0.59	***	(0.06)
Gesamtschule	0.16	*	(0.06)	0.16	**	(0.06)	0.16	*	(0.06)	0.16	**	(0.06)
Female	0.13	***	(0.03)	0.13	***	(0.03)	0.13	***	(0.03)	0.13	***	(0.03)
Age	-0.04	**	(0.01)	-0.04	**	(0.01)	-0.04	**	(0.01)	-0.04	**	(0.01)
Parental education (ref. low)												
medium	-0.05		(0.04)	-0.05		(0.04)	-0.05		(0.04)	-0.05		(0.04)
high	-0.12	**	(0.04)	-0.12	**	(0.04)	-0.12	**	(0.04)	-0.12	**	(0.04)
Occupational status (ISEI)	0.01		(0.02)	0.01		(0.02)	0.01		(0.02)	0.01		(0.02)
Number of books	0.08	***	(0.01)	0.08	***	(0.01)	0.08	***	(0.01)	0.08	***	(0.01)

Migrant origin*incentives

Migrant origin*Idealistic aspirations

	Model 1		Model 2		Model 3		Model 4	
Turkey*medium	-0.39	(0.22)	-0.39	(0.23)				
Turkey*high	-0.52 *	(0.22)	-0.51 *	(0.23)				
FSU*medium	-0.07	(0.23)	-0.07	(0.23)				
FSU*high	-0.21	(0.22)	-0.20	(0.23)				
Other*medium	-0.03	(0.19)	-0.03	(0.19)				
Other*high	-0.16	(0.19)	-0.15	(0.19)				

Migrant origin*Realistic aspirations

	Model 1		Model 2		Model 3		Model 4	
Turkey*medium					0.05	(0.12)	0.08	(0.12)
Turkey*high					-0.06	(0.13)	0.03	(0.13)
FSU*medium					0.19	(0.13)	0.22	(0.13)
FSU*high					0.09	(0.13)	0.15	(0.13)
Other*medium					0.12	(0.11)	0.13	(0.11)
Other*high					0.05	(0.11)	0.07	(0.11)

Exposure*incentives

Language use at home*Idealistic aspirations

	Model 1		Model 2		Model 3		Model 4	
medium			-0.00	(0.05)				
high			0.02	(0.05)				

Language use at home*Realistic aspirations

	Model 1		Model 2		Model 3		Model 4	
medium							0.03	(0.03)
high							0.10 **	(0.04)

| R^2 | 0.45 | | 0.45 | | 0.45 | | 0.45 | |

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$; robust standard errors in parentheses; N=14,872.

Table 4: OLS regressions for reading achievement

	Model 5a			Model 5b			Model 6a			Model 6b		
Migrant origin (ref. Poland)												
Turkey	-0.29	***	(0.05)	-0.28	***	(0.05)	-0.29	***	(0.05)	-0.29	***	(0.05)
FSU	0.01		(0.05)	0.01		(0.05)	0.00		(0.05)	-0.00		(0.05)
Other	-0.05		(0.04)	-0.05		(0.04)	-0.06		(0.04)	-0.06		(0.04)
Born abroad	-0.04		(0.03)	-0.04		(0.03)	-0.04		(0.03)	-0.04		(0.03)
Incentives												
Idealistic aspirations (ref. low)												
medium	0.17	**	(0.05)	0.17	**	(0.05)	0.18	**	(0.05)	0.18	**	(0.05)
high	0.23	***	(0.06)	0.23	***	(0.06)	0.23	***	(0.06)	0.23	***	(0.06)
Realistic aspirations (ref. low)												
medium	0.09	*	(0.04)	0.10	*	(0.04)	0.09	*	(0.04)	0.09	*	(0.04)
high	0.28	***	(0.05)	0.28	***	(0.05)	0.28	***	(0.05)	0.28	***	(0.05)
Self-concept	0.15	***	(0.04)	0.14	***	(0.04)	0.07	***	(0.01)	0.07	***	(0.01)
Subject-related interest	0.07	***	(0.01)	0.07	***	(0.01)	0.12	***	(0.04)	0.11	**	(0.04)
Exposure												
Language use at home	0.11	***	(0.02)	0.11	***	(0.02)	0.11	***	(0.02)	0.11	***	(0.02)
Efficiency												
Cognitive ability	0.26	***	(0.01)	0.26	***	(0.01)	0.26	***	(0.01)	0.26	***	(0.01)
Controls												
School track (ref. Hauptschule)												
Realschule	0.29	***	(0.04)	0.28	***	(0.04)	0.29	***	(0.04)	0.29	***	(0.04)
Gymnasium	0.60	***	(0.06)	0.59	***	(0.06)	0.60	***	(0.06)	0.60	***	(0.06)
Gesamtschule	0.15	*	(0.06)	0.15	*	(0.06)	0.16	**	(0.06)	0.16	**	(0.06)
Female	0.13	***	(0.03)	0.13	***	(0.03)	0.13	***	(0.03)	0.13	***	(0.03)
Age	-0.04	**	(0.01)	-0.04	**	(0.01)	-0.04	**	(0.01)	-0.04	**	(0.01)
Parental education (ref. low)												
medium	-0.05		(0.04)	-0.05		(0.04)	-0.05		(0.04)	-0.05		(0.04)
high	-0.12	**	(0.04)	-0.12	**	(0.04)	-0.12	**	(0.04)	-0.12	**	(0.04)
Occupational status (ISEI)	0.01		(0.02)	0.01		(0.02)	0.01		(0.02)	0.01		(0.02)
Number of books	0.08	***	(0.01)	0.08	***	(0.01)	0.08	***	(0.01)	0.08	***	(0.01)

	Model 1			Model 2			Model 3			Model 4		
Migrant origin*incentives												
Migrant origin*Self-concept												
Turkey	-0.13	**	(0.05)	-0.11	*	(0.05)						
FSU	-0.07		(0.04)	-0.06		(0.04)						
Other	-0.11	*	(0.05)	-0.08		(0.05)						
Migrant origin*Subject-related interest												
Turkey							-0.10	*	(0.05)	-0.06		(0.05)
FSU							-0.12	*	(0.05)	-0.09		(0.05)
Other							-0.02		(0.04)	-0.01		(0.04)
Exposure*incentives												
Language use at home*Self-concept				0.03	*	(0.01)						
Language use at home*Subject-related interest										0.04	**	(0.01)
R^2	0.45			0.45			0.45			0.45		

Note: * $p<0.05$, ** $p<0.01$, *** $p<0.001$; robust standard errors in parentheses; N=14,872.