Eighth graders' expository text comprehension

Do motivational aspects add to cognitive skills?

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The present study examined whether ten motivations to read expository texts moderated the effects of cognitive skills on eighth graders' expository text comprehension, while accounting for the main effects of cognitive skills. Furthermore, it was examined whether the effect of motivational dimensions on expository text comprehension differed between monolingual and bilingual Dutch students, and between poor and good readers. Hundred fifty-two eighth graders took tests measuring their expository text comprehension, sentence reading fluency, linguistic knowledge, metacognitive knowledge and motivations to read expository texts. None of ten motivational aspects did moderate the effect of cognitive skills on expository text comprehension. Furthermore, there were no differences between monolingual and bilingual Dutch students, or between poor and good readers, in terms of the relationship between motivational dimensions and expository text comprehension. Differences between our findings and results from other studies are interpreted in the context of measurement specificity and the school system.

Keywords: motivations to read, expository text comprehension, secondary school, cognitive skills, bilingual readers

1. Introduction

In trying to understand individual differences in text comprehension, most researchers have focused either on cognitive predictors (e.g., Trapman, Van Gelderen, Van Steensel, Van Schooten, & Hulstijn, 2014; Van Gelderen, Schoonen, Stoel, De Glopper, & Hulstijn, 2007) or on motivational predictors (e.g., Ho & Guthrie, 2013; Wigfield, Cambria, & Ho, 2012). However, both types of predictors

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are rarely examined together (see also Taboada, Tonks, Wigfield, & Guthrie, 2009). In our view, it is important to take cognitive skills into account when studying the effects of motivations on text comprehension, because we assume that the cognitive skills underlying text comprehension fully mediate the influence of motivational factors.

In this context, we consider two non-competing models. The first model is shown in Figure 1 and concerns the *development* of reading comprehension. According to this model, motivations to read affect behavioral engagement (time, effort and persistence in reading), cognitive engagement (willingness to exert mental effort) and emotional engagement in reading (positive or negative affective reactions). These factors, in turn, influence the development of the cognitive subskills required for reading comprehension. The first model is identical to Guthrie, Wigfield and You's model of reading engagement (see Guthrie, Wigfield, & You, 2012), with one exception: whereas in our model the development of cognitive skills underlying text comprehension fully mediate the effect of engagement on reading comprehension development, there is a direct relationship between engagement in reading and reading competence in Guthrie et al.'s model. Our modification of Guthrie et al.'s model takes into account the complex componential nature of reading comprehension development: not reading comprehension as a whole, but subskills, such as vocabulary knowledge and reading fluency, are assumed to be directly affected by engagement.[1] To our knowledge studies on motivation have not addressed this issue: only relationships between engagement and reading comprehension as a whole have been examined so far (for an overview see Guthrie et al., 2012).

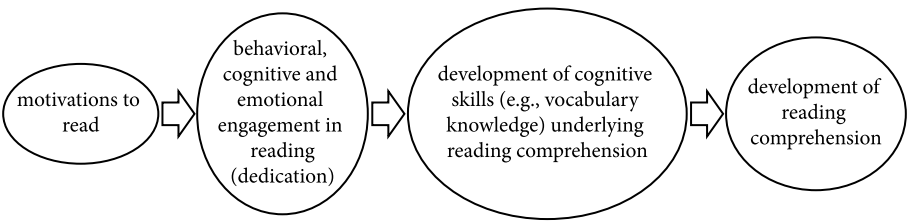

Figure 1. Model that explains how motivations to read influence the development of reading comprehension indirectly (adapted from Guthrie et al., 2012)

The second model (shown in Figure 2), in contrast to the first model, does not concern the *development* of reading comprehension skill, but explains how

1. Note that reciprocal relationships (i.e., adding arrows from right to left) are not displayed in Figure 1. However, the development of cognitive skills is also likely to increase engagement, for example.

the comprehension *level* of texts is affected by motivations to read. Motivations to read are assumed to affect behavioral, cognitive and emotional engagement when reading a particular text, which in turn affects the contribution of cognitive subskills to the level of reading comprehension. We based this model on findings from four studies predicting text comprehension with cognitive skills and motivational aspects (i.e., Anmarkrud & Bråten, 2009; Logan, Medford, & Hughes, 2011; Schaffner & Schiefele, 2013; Taboada et al., 2009). All four studies found that motivational aspects had unique predictive value for text comprehension controlling for cognitive skills. Therefore, it was assumed that this finding reflected that readers who hold more positive motivations to text reading employ their cognitive capacities to a greater extent when reading than their less motivated peers do. It was, however, not tested statistically in these studies whether motivations to read were indeed moderating the effect cognitive skills had on text comprehension, for example by examining interaction effects between motivational dimensions and cognitive subskills.

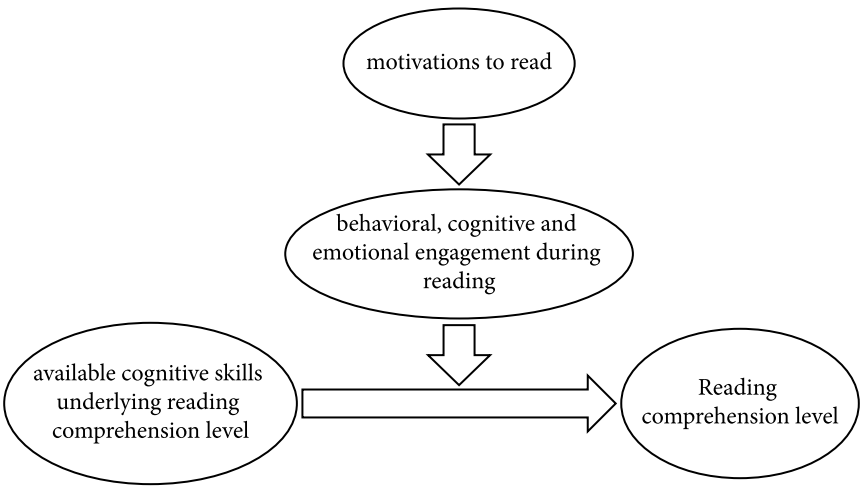

Figure 2. Model that explains how motivations to read affect reading comprehension level of texts

We expect that motivations to read will moderate the effect of cognitive skills on text comprehension, as depicted in Figure 2. A reader not motivated to grasp the meaning of a text may not fully exploit his cognitive resources; for example, he may read sloppily, skipping text parts, and therefore may not fully benefit from his vocabulary knowledge. Or he may not use context to infer the meaning of an unknown word, even though he has adequate metacognitive knowledge about strategies to find out the meaning of unknown words. Conversely,

readers who are positively motivated to read are expected to fully benefit from their cognitive resources. The effect cognitive skills have on text comprehension is therefore expected to be stronger for readers who are relatively more motivated to understand expository texts. Apart from our expectation that positive motivations *facilitate* the optimal use of available cognitive skills, Walczyk and colleagues (cf., Walczyk, 1995; 2000; Walczyk et al., 2007) have also put forward that positive motivations may stimulate readers to *compensate* for a lack of sufficient cognitive resources by rereading text parts to compensate for fluency problems, for instance, or by using context to infer the meaning of words to deal with vocabulary difficulties (cf., Walczyk, 1995; 2000; Walczyk et al., 2007).

1.1 The importance of motivational aspects for subgroups

The likely role of motivations to read in compensating for lack of reading skills, may cause motivations to have a stronger predictive value for text comprehension level within groups of readers with less than optimal cognitive resources. In this line of reasoning, Logan et. al (2011) expected that motivations to read may be important to differentiate between text comprehension levels of relatively poor readers (with comparably low cognitive subskills), but not for differentiating between relatively strong readers (with better developed cognitive subskills). Motivation may work as an energizer to persist despite difficulties, more for poor readers than for strong readers, for example triggering them to initiate compensating behavior to deal with fluency or vocabulary difficulties.

Although Logan et al. (2011) found that nine to eleven year old poor readers in general have slightly – but not significantly – lower intrinsic motivation (i.e. enjoying reading for its own sake) than their peers with better comprehension skills, intrinsic motivation was a more important factor for the poor readers in their study: it predicted text comprehension differences on top of the variance accounted for by cognitive skills (decoding and verbal IQ) within the group of poor readers but not for a subgroup of good readers.

If readers with fewer cognitive resources indeed benefit more from better motivation with regards to text comprehension, the predictive value of motivation may also be higher for readers with a language minority background. It has been shown that bilinguals with a language minority background have lower linguistic knowledge levels in the majority language than their monolingual peers do (e.g., Aarts & Verhoeven, 1999; Mancilla-Martinez & Lesaux, 2010; Manis, Lindsey, & Bailey, 2004; Páez, Tabors, & López, 2007; Swanson, Sáez, & Gerber, 2006; Trapman et al., 2014; Van Gelderen et al., 2003; Verhoeven, 2000). Therefore, it is expected that bilinguals with a language minority background experience reading as more difficult and challenging, and require more effort and strategic behavior

to grasp the meaning of a text. Motivation may therefore have stronger predictive value for these readers, from a "motivation-as-a-compensator-perspective" (cf., Walczyk, 1995; 2000; Walczyk et al., 2007).

1.2 The present study

The present study has two aims. The first one is to investigate whether motivations to read moderate the contribution of cognitive skills to eighth graders' expository text comprehension, as depicted in Figure 2. Examining motivations to read, and their relationship with expository text comprehension, seems especially important for secondary school readers, since motivation for academic activities, such as reading expository texts in school books, has been shown to decrease at secondary school (Schunk, Pintrich, & Meece, 2008; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006).

We view reading motivation as a multifaceted construct and adhere to Guthrie and Wigfield's (2000, p. 406) definition of reading motivation, which is as follows: "Reading motivation is the individual's personal goals, values and beliefs with regard to the topics, processes and outcomes of reading". We measured a total of ten motivational goals, values and beliefs, which we hypothesized to be potential moderators of the effect of cognitive skills on expository text comprehension. These motivational aspects will be discussed in the next part of this introductory section, as well as the theoretical perspectives they are drawn from. To conclude the introductory section, we will discuss the cognitive skills included in this study.

A second aim of the present study is to examine whether the contribution of motivational dimensions to expository text comprehension differs between poor and good readers, and between Dutch monolingual and bilingual readers with a language minority background. Differences between bilinguals with and without the majority language (Dutch) as a dominant language were also explored, as we hypothesized that these two groups could differ in terms of the cognitive language resources of the majority language, which may affect the role motivation plays for these two subgroups. Our two aims led to the two following research questions:

1. Do motivations to read expository texts moderate the effect of cognitive skills on expository text comprehension?
2. Does the predictive value of motivational aspects for expository text comprehension differ between poor and good readers and between monolingual and bilingual Dutch readers?

1.3 Motivations to read expository texts

Eight of the ten motivations we measured have been derived from the *Motivations for Reading Information Books School Questionnaire* (MRIB-S: Guthrie, Coddington, & Wigfield, 2009). We tapped into these eight motivations, which have been argued to play a role in the development of reading comprehension, as outlined in Figure 1 (for an overview see Wigfield et al., 2012). In this section, we will explain for each motivation how it is assumed to be associated with reading comprehension development. We put to the test whether these eight motivations could also play a role as moderators of cognitive skills during reading, as depicted in Figure 2.

We tapped into four affirmative and four undermining motivations, which respectively have been argued to either support or hamper reading comprehension development (for an overview, see Wigfield et al., 2012). Intrinsic motivation, value, self-efficacy and peer value are the four affirmative motivations; avoidance, devalue, perceived difficulty and peer devalue are the undermining ones. From these motivations four pairs can be constructed, each consisting of an affirmative and an undermining motivation: (1) intrinsic motivation and avoidance, (2) valuing and devaluing, (3) self-efficacy and perceived difficulty, (4) peer value and peer devalue.

Although the motivations of each pair are related, these motivations are empirically distinct: for each pair, factor analyses of the items have shown that a two factor solution was a better fit than a one factor solution (e.g., Coddington, 2009; Guthrie & Coddington, 2009; Guthrie et al., 2009; Guthrie & Klauda, 2014; Guthrie, Klauda, & Ho, 2013; Ho & Guthrie, 2013; Van Steensel, Oostdam, & Van Gelderen, 2013; Wigfield et al., 2012). In other words, the score on an affirmative motivation of each pair does not necessarily correspond with the opposite score on the related undermining motivation. For example, a reader who does not enjoy expository text reading (low intrinsic motivation) does not necessarily avoid expository text reading (high avoidance motivation).

Intrinsic motivation is conceptualized as enjoyment in reading expository texts and having a desire to read them often (Gottfried, Fleming, & Gottfried, 2001; Ryan & Connell, 1989; Unrau & Schlackman, 2006). This construct is drawn from self-determination theory (Ryan & Deci, 2000), which argues that intrinsic motivation is maintained only when people feel competent and self-determined. According to self-determination theorists, less autonomy in choosing an activity, for example exerting external control, is likely to reduce intrinsic motivation. Avoidance is conceptualized as an aversion towards reading expository texts for school and trying to spend as little time and effort reading expository texts as possible. Avoidance stems from goal orientation theories, which have identified work

avoidance as one of the goals students hold (Dowson & McInerney, 2003; Meece & Miller, 2001).

Valuing is classified as believing that reading expository texts for school is useful and important for one's future (Trautwein, Lüdtke, Schnyder, & Niggli, 2006; Wigfield & Eccles, 2000), whereas a devaluing reading motivation means holding the view that reading expository texts is not important or useful for one's future (Legault, Green-Demers, & Pelletier, 2006). Valuing and devaluing are based on expectancy-value theory (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000) which argues that choices to engage in a task and task performance depend on complex interactions between personal expectancies and values associated with the task. Note that although we define valuing and devaluing as opposites here, they load on different factors (e.g., Wigfield et al., 2012) and are not assessed as opposite ends of the same scale.

Reading self-efficacy is conceptualized as the belief in one's ability to read expository texts with success (Schunk, 2003; Usher & Pajares, 2006) and stems from self-efficacy theory (Bandura, 1997), which discusses various factors that contribute to a person's perceived self-efficacy for a certain task, such as his or her previous task performance. Perceived difficulty is defined as the view that reading expository text is a difficult task. Chapman and Tunmer (2003) show that perceived difficulty develops in particular among struggling readers and that this development in turn contributes to a lack of self-efficacy for these readers. Note, however, that perceived difficulty and self-efficacy, as mentioned before, are separate factors in factor analyses (Chapman & Tunmer, 1995; Wigfield et al., 2012).

Lastly, peer value and peer devalue are defined as the belief that peers either value or devalue someone's viewpoints about reading and reading habits. These two constructs have been based on research that shows that peers or groups can positively or negatively influence an individual's motivations and academic outcomes (Kindermann, 2007; Ryan, 2001; Wentzel, 1996). Again, although we define peer value and peer devalue as opposites here, they are not assessed as opposite ends of the same scale and appear to load on different factors (e.g., Wigfield et al., 2012).

In addition to the eight motivations of the MRIB-S questionnaire, we measured two additional motivations that could moderate the impact of cognitive skills on expository text comprehension. The first one, preference for challenge, we define as having a preference for reading and mastering difficult and challenging expository texts. We considered this motivation to be an important construct for expository text reading in particular, as secondary school students appear to find these texts difficult and challenging (see for example Wigfield et al., 2012). Our items were based on the preference for challenge items from the Motivation for Reading Questionnaire (Wang & Guthrie, 2004; Wigfield & Guthrie, 1997),

which measured preference for challenging texts irrespective of genre. We adapted items to address expository texts specifically.

The second added motivation, mastery goal, was defined as being motivated to understand expository texts as thoroughly as possible (cf., Guthrie et al., 2013) and to become better at this task irrespective of how interesting texts are. We expected that a mastery goal towards expository text comprehension overrules students' possible feelings that texts are difficult or uninteresting (see for example Wigfield et al., 2012). We hypothesized that holding a mastery goal towards expository text reading results in increased behavioral and cognitive engagement, and, consequently, in a better level of text understanding even though students might not be intrinsically motivated to read expository texts. The motivation mastery goal was based on goal orientation theory (Patrick, Ryan, & Pintrich, 1999; Pintrich, 2000): people with a mastery goal orientation have a desire to gain understanding, insight or skill as a goal in itself.

1.4 Cognitive skills required for expository texts

In the present study, we measured reading fluency, linguistic knowledge and metacognitive knowledge about reading strategies and text structure to account for the cognitive skills required to comprehend a text. These three skills have been shown to be associated with reading comprehension skill in various studies (e.g., Cromley & Azevedo, 2007; O'Reilly & McNamara, 2007; Schoonen, Hulstijn, & Bossers, 1998; Trapman et al., 2014; Van Gelderen et al., 2007) and several well-acknowledged reading models (e.g., Kintsch et al.'s construction integration model: Kintsch, 1998; Kintsch & Rawson, 2005; and Perfetti et al.'s framework for reading comprehension: Perfetti, 1999; Perfetti, Landi, & Oakhill, 2005).

Reading fluency has been considered important in the context of a limited working memory capacity. As attentional resources are limited, fluent word and sentence processing have been put forward as a necessity for a reader's execution of higher order comprehension processes (e.g., Just & Carpenter, 1992; LaBerge & Samuels, 1974; Perfetti, 1985; Perfetti & Lesgold, 1977; Perfetti & Hart, 2001). The relationship between linguistic knowledge and reading comprehension is also widely acknowledged (e.g., Beck, Perfetti, & McKeown, 1982; Carlisle, 2007; McKeown, Beck, Omanson, & Perfetti, 1983; Nagy, 2007; Stahl & Fairbanks, 1986; Van Gelderen et al., 2007): Although it is possible to infer the meaning of unknown words in a text to some extent, a large proportion of words in a text needs to be known to achieve sufficient comprehension; estimates range from 95% to 98% (Hu & Nation, 2000; Laufer, 1989; Schmitt, Jiang, & Grabe, 2011). Lastly, metacognitive knowledge was included because it has been shown to be a predictor of text comprehension, even after controlling for language skills

(e.g., Cromley & Azevedo, 2007; Schoonen et al., 1998; Trapman et al., 2014; Van Gelderen et al., 2007).

2. Method[2]

2.1 Participants

The study started with 337 students from thirteen eight grade classes in three secondary schools. Students were excluded from the analyses if school reports indicated they had learning or specific reading problems like dyslexia ($n=16$), if the test administrators' notes indicated that they demonstrated disobedient behavior during one or more class administered tests ($n=91$) or if they had one or more test scores missing due to absence during a testing session or exclusion of their test scores ($n=38$). Test scores were excluded for students who skipped half or more of the items on a test and for students who scored below chance level, since both were regarded as an indication of test disturbance. In addition, after the first two testing sessions, one school decided to discontinue participation for most students ($n=40$, school B in Table 1).

The large attrition due to misbehavior is related to the challenging school population at the participating urban schools and the teachers' ability to manage the classroom during test administration. Most misbehavior was on expository text comprehension ($n=59$), and coupled with the other reasons for exclusion of test scores, this left us with 191 students with valid scores on the expository text comprehension test. Our analyses were performed on a sample of 152 students who had no missing scores for the other tests either. In our final sample, the distribution in terms of educational levels was as follows: 38% received instruction at a low educational level ($n=58$), 20% at an intermediate educational level ($n=30$) and 42% at a high educational level ($n=64$). Table 1 shows the number of students per school, per class and the educational level of each class.

Students were regarded as monolingual Dutch ($n=51$) if they indicated in the background questionnaire (see Instruments section) that Dutch was their only mother tongue, and as bilingual Dutch ($n=101$) if one or more languages other than Dutch were involved in their initial language acquisition. All but seven of the bilingual students were born in the Netherlands and only two of them had

2. This method section has overlap with the method section of Welie et al. (2017). Welie et al. used the same participants (and an additional 20 students) as well as the same tests (except for the motivation questionnaire) to examine the role of knowledge of connectives in expository text comprehension.

Table 1. Students included in the analyses per school, class and the educational level of each class

School	Class	Educational level*	Number of students
A	A1, A2, A3, A4	Low	51
	A5	Intermediate	14
	A6, A7	High	46
		Total	**111**
B	B1	Low	7
	B2	Intermediate	3
	B3	High	6
		Total	**16**
C	C1, C2	Intermediate	13
	C3	High	12
		Total	**25**
		Total all schools	**152**

* The educational levels correspond to the following educational levels in Dutch secondary school: low = *vmbo-t* (prevocational level) or *vmbo-t/havo* (prevocational/general secondary educational level), intermediate = *havo* (general secondary educational level) or *havo/vwo* (general secondary educational/pre-university level), high = *vwo* (pre-university level).

received less than five years of primary education in the Netherlands. The bilingual students were assigned to the Bilinguals Dutch dominant at home group ($n = 39$) if they indicated that their parents spoke Dutch to them at least 50% of the time, the other bilinguals were assigned to the Bilinguals Dutch not dominant group ($n = 62$).

2.2 Instruments

The students were administered five tests, which measured their expository text comprehension, linguistic knowledge (two tests), metacognitive knowledge and sentence reading fluency. In addition, students also filled out two questionnaires, one tapping into motivations to read, the other into background information.

Expository text comprehension

The expository text comprehension test comprised 35 multiple choice questions (with three or four answer options) about five expository texts. Texts varied in length between 184 and 449 words and addressed various topics. Four texts were derived from the database of *Diataal*, a Dutch testing institute (Hacquebord, Stellingwerf, Linthorst, & Andringa, 2005). One text was derived from the reading

comprehension test used in a study by Van Gelderen et al. (2007). Texts and questions were adapted slightly.

Linguistic knowledge

Two tests measured linguistic knowledge. One was a digitally administered *general vocabulary knowledge* test developed by *Diataal* (Hacquebord et al., 2005) that consisted of 70 multiple choice items. The 70 target words were drawn from a corpus of school book texts. The other linguistic knowledge test tapped into students' *knowledge of connectives* specifically, by means of 43 fill-in-the-blank items. The test comprised six short expository texts with blanks. For each blank, students had to choose the appropriate connective out of three options. Relationships between the propositions that had to be connected were regarded as familiar to all students.

Metacognitive knowledge

To measure students' metacognitive knowledge of text structure and reading and writing strategies, we used an adapted version of the metacognitive knowledge test used by Van Gelderen et al. (2007). The original test was reduced to 45 statements. In this test, participants had to indicate whether or not they agreed with statements about text structure and writing and reading strategies. For example, a correct response would be if they agreed with the following statement: *if you do not understand the meaning of a word, it is useful to try and guess its meaning by looking at other words and sentences surrounding the unfamiliar word.*

Sentence reading fluency

Sentence reading fluency was measured by a sentence verification test similar to the one used by Van Gelderen et al. (2007). Students were presented 110 sentences on a laptop screen and had to decide as fast as possible whether a sentence made sense or not by pressing a green or a red stickered key, respectively, on their laptops' keyboards. Half of the sentences made sense, the others did not. Sentences that did not make sense were in flagrant contradiction with encyclopedic knowledge all students were considered to share (e.g., *Alligators are adorable and harmless pets* and *In the Netherlands, Christmas is always celebrated in the summer* were sentences that did not make sense). Reading fluency was calculated by averaging the reaction times on the correct responses to the sentences that make sense.

Motivations to read

Motivations to read expository texts were assessed by means of a 76 item questionnaire, which taps into the following 10 motivational aspects (between brackets the number of items): *intrinsic motivation* (8), *avoidance* (7), *value* (7), *devalue* (7), *self-efficacy* (7), *perceived difficulty* (7), *peer value* (7), *peer devalue* (7), *preference*

for challenge (7) and *mastery goal* (12). The first eight motivations are based on the *Motivations for Reading Information Books School* questionnaire (MRIB-S: Guthrie et al., 2009), which was translated into Dutch. In contrast to the MRIB-S, which referred to reading information texts at school specifically, we referred to information text reading at school or elsewhere, in order to get a complete picture of the levels of motivations to read information texts for school. In a pilot study, eight items of our questionnaire appeared to reduce the reliability of our motivational subscales and were revised.

Students who took the questionnaire had to indicate on a 5 point Likert scale to what extent they agreed with 76 statements (i.e., to what extent the statements applied to their situation). They could choose one of the following options: totally disagree, disagree, neither disagree nor agree, agree and totally agree. Students received an oral instruction by a test assistant; the instruction was also printed in their questionnaire. The instruction stressed that there were no wrong or right answers; that is, students were requested to give their own opinion about the statements. Examples of statements are (between brackets the motivational aspect):

- I enjoy reading information texts for school (intrinsic motivation)
- I try to read information texts for school as less as possible (avoidance)
- I enjoy reading difficult and challenging information texts for school (preference for challenge)

Table 2 shows the internal consistency (Cronbach's Alpha) of the tests and the motivational subscales for the whole sample and for subgroups based on language background. Expository text comprehension and the control variables generally showed satisfactory reliability estimates between .70 and .96, except for metacognitive knowledge, for which reliability estimates were between .60 and .66. Reliability estimates of the motivational subscales were also satisfactory, with three exceptions: for the monolingual Dutch and for bilingual Dutch dominant group peer devalue's reliability estimates were .66 and .64 respectively, and for the monolingual Dutch group self-efficacy had a reliability estimate of .67.

Background questionnaire

The background questionnaire requested the following information: gender, country of birth, mother tongue, language(s) the parents/care-takers speak to participants (and percentages of the time they speak these languages to them), country of birth of parents/caretakers, the highest completed educational level of parents/caretakers and jobs of parents/caretakers.

2.3 Procedure

From March till June 2014 tests and questionnaires were administered, each one in a separate testing session. Students were given enough time to complete them. Tests and questionnaires were administered during regular classes, except for the reading fluency test, for which participants were taken out of their regular classes in groups of four and led to a separate testing room. Test administrators took notes on students' behavior during plenary test administrations.

Table 2. Reliability estimates of the tests for the whole group and the subgroups

	Number of items	All students ($n = 152$)	Monolingual Dutch ($n = 51$)	Bilingual Dutch ($n = 101$)	Bilinguals Dutch dominant ($n = 39$)	Bilinguals Dutch not dominant ($n = 62$)
Expository text comprehension	35	.79	.84	.74	.77	.70
Control variables: Cognitive skills						
General vocabulary	70	.83	.79	.80	.84	.77
Knowledge of connectives	43	.83	.84	.79	.78	.80
Metacognitive knowledge	45	.66	.60	.65	.64	.66
Sentence reading fluency *(RT in msec)*	46	.96	.96	.96	.95	.95
Motivations to read						
Intrinsic motivation	8	.83	.83	.82	.84	.81
Avoidance	7	.82	.85	.79	.81	.78
Value	7	.83	.83	.82	.86	.79
Devalue	7	.84	.84	.85	.90	.84
Self-efficacy	7	.75	.67	.79	.78	.81
Perceived difficulty	7	.76	.82	.73	.69	.75
Peer value	7	.75	.76	.75	.74	.77
Peer devalue	7	.72	.66	.75	.64	.80
Preference for challenge	7	.79	.82	.78	.71	.84
Mastery goal	12	.89	.88	.90	.93	.87

2.4 Scoring and missing value treatment

On the general vocabulary test and the reading fluency test, there were no missing responses, because these digital tests required a response for every item. Skipped items in the expository text comprehension, knowledge of connectives and metacognitive knowledge test were scored as incorrect. For the reading fluency test, the procedure described in Van Gelderen et al. (2003) was used for scoring and missing value treatment. Skipped items in the motivation questionnaire were estimated with items of the corresponding motivation subscale only.

2.5 Analyses

To examine the validity of the separate factors in reading motivation, confirmatory factor analyses by structural equation modeling were performed (in LISREL). Since sample size was too small to fit a 10-factor model to the 76 item scores representing the ten motivational aspects, analyses were performed with subsets of the data. First, for each of the four pairs with an affirming and a corresponding undermining counterpart it was examined whether – as previously has been established – a two factor solution gave a better fit to the data than a one factor model. Second, it was examined whether the two motivations we added to the MRIB-S questionnaire, that is, preference for challenge and mastery goal, were to be considered a single factor together with intrinsic motivation or whether a three factor model was more appropriate. We examined this because, in the reading motivation literature, it has been questioned whether these three constructs differ from each other (e.g., Eccles & Wigfield, 2002; Wang & Guthrie, 2004; Wigfield & Guthrie, 1997). Third, through the use of sum scores for the separate motivational aspects (i.e. parcel scores), it was examined whether the ten parcel scores could be accounted for by a one factor or a two factor model. In the latter model, the two factors represented affirming (6 parcel scores) and undermining motivations (4 parcel scores), respectively. A six-factor model (for the four pairs of the MRIB-S and the two added dimensions) could not be fitted, because of the low number of indicator variables per factor (1–2). The parcel scores were treated as continuous variables, using Pearson correlations; the item scores were treated as ordinal five point Likert scales, and therefore polychoric correlations were computed in PRELIS.

Motivational subscales were constructed based on the results of the confirmatory factor analyses. Means and standard deviations on all tests and on the motivational subscales were computed for the whole sample and separately for the one monolingual and two bilingual subgroups (Dutch dominant versus Dutch not dominant). Because students came from different classes, all regression analyses

were performed with a random intercept for class. Differences between monolinguals and bilingual Dutch students and between the two bilingual subgroups on the tests and the reading motivations were investigated by the use of regression analyses, with the tests as dependent variables and two independent (i.e. orthogonal) contrasts as predictor variables: one predictor contrasting monolingual versus bilingual Dutch students and one contrasting the two bilingual groups. Effect sizes of the differences are reported as the increase in total explained variance (Δr^2). Furthermore, correlations between the test scores were calculated for the whole sample and for the various subsamples.

To answer our first research question, we performed various hierarchical regression analyses. First, each distinct motivational aspect was included into a regression analysis after the cognitive skills were entered. Next, for each of these cognitive skills, interactions with each motivational aspect were examined separately.

To examine our second research question, we examined interaction effects between each of the motivational aspects and language background, and between each of the motivational aspects and reading proficiency levels. The interactions with reading proficiency level were tested by means of two dummy variables that differentiated between the 50% best scoring ($n=76$) and the 50% worst scoring ($n=76$) students on the expository text comprehension test (for a similar method see Rijkeboer, Van den Bergh, & Van den Bout, 2011).

The abovementioned regression analyses were also performed with a sample size of 191 students to check for the robustness of our results. These 191 students all had a valid score on expository text comprehension, while 39 of these students had a score missing on one ($n=31$), two ($n=6$) or three ($n=2$) of the predictor variables. For our robustness check, we created a dummy variable for each predictor that represented whether a score was missing (a score of (1) or not (a score of 0) for the associated predictor. We entered these dummy variables in our regression models along with the associated predictor variables. These regression models did not include a fixed intercept and missing scores on the standardized predictor variables were recoded into a score of 0 (see Koomen & Hoeksma, 1991). This method enabled us to investigate whether the outcomes of our models were affected (i.e., different from the sample with 152 students) when our models controlled for the variance accounted for in text comprehension by differences between students who either missed or did not miss a score for every predictor variable.

3. Results

3.1 Confirmatory factor analyses

The factor analyses showed that two factor solutions were a better fit than one factor solutions for three out of four motivation pairs, as was indicated by the difference in χ^2 goodness of fit: intrinsic-avoidance ($\chi^2(1) = 26.8$, $p < .001$) valuing-devaluing ($\chi^2(1) = 53.38$, $p < .001$) and peer value-peer devalue ($\chi^2(1) = 50.82$, $p < .001$). For the pair self-efficacy-perceived difficulty a two factor model was not a significantly better fit than a model comprising one factor ($\chi^2(1) = 2.26$, $p = .13$). Although our main interest is a comparison of the fit of the one factor and the two factor models, the absolute fit of the two factor models was reasonable, i.e. ratio of Satorra-Bentler scaled χ^2/df was < 2 in all cases and RMSEA ranged from .033 to .092.

In comparison to a one- or two factor model, a three factor model was the best solution for the 27 items representing the motivational aspects preference for challenge, mastery goal and intrinsic motivation ($\chi^2(321) = 535.85$, $p = .001$, RMSEA .067). A three factor model was a better solution than a two factor model that collapsed the relatively strongly correlated preference for challenge and intrinsic motivation ($\chi^2(1) = 22.29$, $p < .001$). A one factor model, of course, fitted the data far worse. Lastly, a two factor model for reading motivation with a distinction between affirming and undermining motivations appeared to be a better fit than a one factor model with no such distinction ($\chi^2(1) = 207.58$, $p < .001$). Because most results support a differentiation between positive and undermining motivations, we decided to treat the ten motivational aspects as separate factors in further analyses, as was intended.

3.2 Descriptive statistics for cognitive skills

Expository text comprehension scores were normalized with Blom's formula (Blom, 1958). The upper part of Table 3 shows the means and standard deviations on the cognitive skills for the whole sample and the various subgroups. Regression analyses revealed that the monolinguals scored higher than the bilinguals on expository text comprehension ($\chi^2(1) = 9.85$, $p < .001$, $\Delta r^2 = .08$), general vocabulary knowledge ($\chi^2(1) = 21.57$, $p < .001$, $\Delta r^2 = .17$), knowledge of connectives ($\chi^2(1) = 13.8$, $p < .001$, $\Delta r^2 = .12$) and metacognitive knowledge ($\chi^2(1) = 6.20$, $p = .01$, $\Delta r^2 = .07$), but there was no significant difference in sentence reading fluency ($\chi^2(1) = .20$, $p = .65$, $\Delta r^2 = .00$). The bilingual Dutch dominant group read faster than the bilingual Dutch not dominant group (sentence reading fluency, $\chi^2(1) = 6.24$, $p = .01$, $\Delta r^2 = .04$), but on the other skills there were no significant differences between

these two subgroups (expository text comprehension, $\chi^2(1) = 2.13$, $p = .14$, $\Delta r^2 = .01$; general vocabulary knowledge, $\chi^2(1) = .71$, $p = .40$, $\Delta r^2 = .00$; knowledge of connectives, $\chi^2(1) = 1.20$, $p = .27$, $\Delta r^2 = .00$; metacognitive knowledge, $\chi^2(1) = .66$, $p = .42$, $\Delta r^2 = .00$).

Table 3. Means (and standard deviations) on the tests for the whole sample and various subgroups

	Number of items or scale range	All students ($n = 152$)	Monolingual Dutch ($n = 51$)	Bilingual Dutch ($n = 101$)	Bilinguals Dutch dominant ($n = 39$)	Bilinguals Dutch not dominant ($n = 62$)
Expository text comprehension	35	24.93 (5.29)	27.03 (5.80)	23.87 (4.70)	23.01 (5.13)	24.42 (4.37)
Control variables: Cognitive skills						
General vocabulary	70	52.93 (7.94)	57.59 (6.35)	50.58 (7.64)	50.95 (8.42)	50.35 (7.17)
Knowledge of connectives	43	31.65 (5.87)	34.49 (5.44)	30.22 (5.58)	29.72 (5.40)	30.53 (5.71)
Metacognitive knowledge	45	35.62 (4.18)	37.12 (3.63)	34.86 (4.26)	34.56 (4.30)	35.05 (4.26)
Sentence reading fluency *(RT in msec)*	46	2848 (505)	2809 (513)	2867 (501)	2715 (489)	2963 (489)
Motivations to read						
Intrinsic motivation	1–5	2.79 (.69)	2.64 (.67)	2.87 (.69)	2.80 (.75)	2.91 (.65)
Avoidance	1–5	2.70 (.68)	2.83 (.73)	2.63 (.65)	2.53 (.68)	2.69 (.63)
Value	1–5	3.61 (.64)	3.53 (.64)	3.64 (.64)	3.63 (.72)	3.65 (.58)
Devalue	1–5	2.52 (.74)	2.55 (.74)	2.51 (.75)	2.52 (.83)	2.50 (.69)
Self-efficacy	1–5	3.53 (.56)	3.50 (.52)	3.54 (.58)	3.53 (.58)	3.55 (.58)
Perceived difficulty	1–5	2.53 (.59)	2.54 (.62)	2.53 (.58)	2.46 (.55)	2.58 (.59)
Peer value	1–5	3.26 (.59)	3.17 (.58)	3.31 (.60)	3.32 (.60)	3.30 (.60)
Peer devalue	1–5	2.34 (.58)	2.36 (.52)	2.33 (.61)	2.32 (.53)	2.33 (.66)
Preference for challenge	1–5	2.83 (.70)	2.80 (.72)	2.85 (.70)	2.85 (.81)	2.84 (.62)
Mastery goal	1–5	3.57 (.67)	3.50 (.64)	3.61 (.69)	3.62 (.80)	3.60 (.62)

3.3 Descriptive statistics for motivations to read

The lower part of Table 3 shows the means and standard deviations on the reading motivations for the whole sample and the various subgroups. All groups scored around the mean (around 3) on the six affirming motivations (i.e. intrinsic

motivation, value, self-efficacy, peer value, preference for challenge and mastery goal), with scores on intrinsic motivation and preference for challenge slightly below the center of the scale and scores on the other four motivations slightly above the center of the scale. Scores for the four undermining motivations (i.e. avoidance, devalue, perceived difficulty and peer devalue) also were around the mean, with peer devalue approaching an average of 2. Regression analyses indicated that the monolinguals did not differ from the bilinguals on any of the reading motivations. We did not find differences between the two bilingual groups on motivational aspects either.

3.4 Correlations

Table 4 displays the correlations between expository text comprehension and its predictors (cognitive skills and motivations to read) for the whole sample and for the subgroups. Cognitive skills, representing linguistic knowledge and metacognitive knowledge correlated moderately and significantly with expository text comprehension (correlations ranging from .31 to .65), while correlations of reading fluency and motivations to read with expository text comprehension were low and non-significant ($-.20 < r < .20$) with one exception: peer value correlated at .30 with expository text comprehension for the bilingual Dutch dominant readers (although non-significant). Many correlations between motivations to read and expository text comprehension were close to zero. Affirmative and undermining motivations correlated as expected: affirmative motivations correlated positively with each other (between .04 and .83), and the undermining motivations did so too (between .03 and .87). Furthermore, affirmative and undermining motivations correlated negatively with each other (between –.04 and –.84).

3.5 Research questions: Predictive value of motivational aspects

Table 5 shows the results of our analyses to answer our research questions. Models 1a to 1j of Table 5 show the results of the regression analyses in which each one of the motivations to read was included in a regression model in addition to the base model including sentence reading fluency, linguistic knowledge and metacognitive knowledge as predictors. Given the low correlations between motivations to read and expository text comprehension, it comes as no surprise that none of the ten reading motivations led to a better model fit for expository text comprehension, controlling for the variance accounted for by the predictors in the base model ($\chi^2(4) = 74.31$, $p < .001$, $\Delta r^2 = .45$). Apparently, the motivational aspects could not account significantly for a portion of the remaining unexplained total variance (55%).

Table 4. Correlations between the cognitive skills and motivations to read for the whole sample and the subgroups

		Cognitive skills			Motivations to read									
		RF	VOC	KOC	MK	IM	AVO	VAL	DEV	SE	PD	Pval	Pdev	PFC	MAS
Cognitive skills	Expository text comprehension														
	All students	−.15	.46*	.64*	.45*	−.10	.12	−.02	−.05	.02	−.04	.02	−.02	−.12	.08
	MD	−.19	.32*	.61*	.49*	−.06	.12	−.09	−.04	.04	−.13	−.00	−.20	−.14	.09
	BD	−.11	.44*	.60*	.38*	−.06	.07	.06	−.07	.02	.02	.08	.06	−.10	.11
	BDdom	−.11	.55*	.53*	.32*	.01	.12	.08	−.14	.19	−.14	.30	−.04	.01	.20
	BDndom	−.18	.37*	.65*	.42*	−.14	−.01	.03	−.01	−.10	.10	−.07	.12	−.19	.02
	Reading fluency (RF) *RT in msec*														
	All students		−.35*	−.31*	−.23*	.08	.00	.08	.07	−.10	.11	.17*	−.14	−.10	.06
	MD		−.49*	−.42*	−.15	.11	.08	.04	.09	−.33*	.25	.11	−.04	−.12	.09
	BD		−.31*	−.25*	−.25*	.05	−.03	.10	.07	−.00	.03	.19	−.18	−.09	.05
	BDdom		−.41*	.37*	−.40*	−.11	.06	.05	.07	−.06	.14	.17	−.17	−.37*	−.02
	BDndom		−.24	−.22	−.19	.14	−.14	.13	.07	.03	−.08	.22	−.20	.14	.11
	Vocabulary knowledge (VOC)														
	All students			.53*	.40*	−.10	.09	−.02	−.10	.04	−.11	−.16*	.12	.01	.00
	MD			.53*	.20	−.09	−.03	−.04	−.12	.24	−.40*	−.12	.03	.04	−.07
	BD			.42*	.38*	−.01	.06	.05	−.12	−.00	.01	−.13	.15	.03	.08
	BDdom			.55*	.50*	.16	.00	.14	−.19	.13	−.16	.03	.24	.28	.19
	BDndom			.34*	.30*	−.15	.12	−.04	−.06	−.10	.13	−.25*	.11	−.22	−.03
	Knowledge of connectives (KOC)														
	All students				.44*	−.15	.11	−.06	−.03	−.03	.02	−.16*	.14	−.06	−.01
	MD				.39*	−.22	.13	−.17	−.05	.05	−.10	−.06	.03	−.11	−.15
	BD				.39*	−.05	.03	.03	−.04	−.04	.07	−.17	.18	−.03	.09
	BDdom				.42*	.19	.01	.22	−.23	.16	−.06	.08	.07	.24	.33*
	BDndom				.36*	−.22	.02	−.11	.09	−.16	.13	−.31*	.23	−.23	−.09

Table 4. *(continued)*

		Cognitive skills				Motivations to read									
		RF	VOC	KOC	MK	IM	AVO	VAL	DEV	SE	PD	Pval	Pdev	PFC	MAS
Cognitive skills	Metacognitive knowledge (MK)														
	All students					−.18*	.08	−.12	−.03	−.08	−.02	−.05	−.02	−.15	−.10
	MD					.03	−.10	−.06	−.24	−.05	−.09	.23	−.34*	−.18	−.06
	BD					−.21*	.12	−.13	.05	−.08	.01	−.13	.08	−.13	−.09
	BDdom					−.04	−.02	−.16	−.05	−.07	−.17	−.12	−.03	.12	−.04
	BDndom					−.35*	.20	−.10	.13	−.08	.10	−.14	.14	−.34*	−.13
	Intrinsic motivation (IM)														
	All students						−.70*	.73*	−.61*	.38*	−.23*	.34*	−.11	.73*	.62*
	MD						−.84*	.61*	−.72*	.25	−.23	.12	−.09	.75*	.49*
	BD						−.62*	.78*	−.56*	.44*	−.23*	.43*	−.11	.73*	.68*
	BDdom						−.69*	.83*	−.68*	.52*	−.25	.42*	−.20	.72*	.72*
	BDndom						−.60*	.74*	−.47*	.38*	−.24	.44*	−.06	.74*	.65*
	Avoidance (AVO)														
	All students							−.61*	.71*	−.34*	.40*	−.30*	.21*	−.62*	−.52*
	MD							−.66*	.87*	−.29*	.31*	−.14	.03	−.77*	−.57*
	BD							−.58*	.64*	−.36*	.45*	−.37*	.29*	−.54*	−.49*
	BDdom							−.60*	.74*	−.39*	.34*	−.27	.26	−.62*	−.48*
	BDndom							−.57*	.56*	−.35*	.52*	−.45*	.32*	−.47*	−.50*
Motivations to read	Value (VAL)														
	All students								−.65*	.41*	−.24*	.38*	−.11	.59*	.74*
	MD								−.70*	.20	−.18	.18	−.08	.56*	.76*
	BD								−.62*	.51*	−.28*	.46*	−.12	.61*	.73*
	BDdom								−.70*	.60*	−.29	.49*	−.27	.56*	.72*
	BDndom								−.54*	.43*	−.28*	.44*	−.03	.66*	.73*

Table 4. *(continued)*

		Cognitive skills				Motivations to read									
		RF	VOC	KOC	MK	IM	AVO	VAL	DEV	SE	PD	Pval	Pdev	PFC	MAS
Motivations to read	Devalue (DEV)														
	All students									−.43*	.36*	−.34*	.20*	−.48*	−.63*
	MD									−.28*	.18	−.22	.11	−.64*	−.60*
	BD									−.49*	.46*	−.39*	.23*	−.39*	−.64*
	BDdom									−.47*	.36*	−.44*	.30	−.48*	−.70*
	BDndom									−.51*	.54*	−.36*	.20	−.30*	−.60*
	Self-efficacy (SE)														
	All students										−.70*	.25*	−.07	.45*	.46*
	MD										−.64*	.04	.13	.42*	.25
	BD										−.73*	.35*	−.15	.46*	.54*
	BDdom										−.68*	.37*	−.32*	.40*	.58*
	BDndom										−.77*	.33*	−.06	.52*	.51*
	Perceived difficulty (PD)														
	All students											−.17*	.19*	−.26*	−.28*
	MD											.03	−.00	−.22	−.16
	BD											−.28*	.28*	−.29*	−.34*
	BDdom											−.25	.30	−.30	−.29
	BDndom											−.30*	.28*	−.29*	−.39*
	Peer value (Pval)														
	All students												−.50*	.22*	.37*
	MD												−.20	.06	.18
	BD												−.63*	.30*	.45*
	BDdom												−.60*	.21	.44*
	BDndom												−.65*	.39*	.46*

Table 4. *(continued)*

		Cognitive skills				Motivations to read									
		RF	VOC	KOC	MK	IM	AVO	VAL	DEV	SE	PD	Pval	Pdev	PFC	MAS
Motivations to read	Peer devalue (Pdev)														
	All students													.09	−.11
	MD													.23	.05
	BD													.03	.17
	BDdom													.13	−.30
	BDndom													−.03	−.09
	Preference for challenge (PFC)														
	All students														.55*
	MD														.52*
	BD														.57*
	BDdom														.53*
	BDndom														.62*

MD, Monolingual Dutch ($n = 51$); BD, Bilingual Dutch ($n = 101$); BDdom, Bilingual Dutch dominant at home ($n = 39$); BDndom, Bilingual Dutch not dominant at home ($n = 62$).

* $p < .05$.

Table 5 also presents the results of models in which interaction effects between cognitive skills and motivations to read were examined, in addition to the predictors of the base model and one of the motivations to read: none of the ten motivational aspects moderated the effect of cognitive skills on expository text comprehension (reading fluency, see models 2a–2j; general vocabulary knowledge, see models 3a–3j; knowledge of connectives, see models 4a–4j; and metacognitive knowledge, see models 5a–5j).

The last two columns of Table 5 show our analyses in which differences in the predictive value of motivations to read were examined for readers with distinct language backgrounds (column 6) and reading proficiency levels (column 7). For none of the ten motivational aspects differences could be established between readers with distinct language backgrounds (monolinguals versus bilinguals and bilingual Dutch dominant versus bilingual Dutch not dominant), see Table 5, models 6a–6j.

The poor and good readers did not differ either in the associations between motivations to read and expository text comprehension with one exception (see Table 5 models 7a–7j): value related to expository text comprehension for the poor readers, but not for the good readers, $\chi^2(1) = 3.99$, $p = .04$, $\Delta r^2 = .00$. Other than expected, however, the relationship between value and expository text comprehension was negative for poor readers (the parameter estimate was −.18 with a standard error of .09), indicating that a higher value was related to a slightly lower expository text comprehension. Note that, although the interaction term between reading proficiency and value was significant, the term explained no unique variance.

3.6 Robustness check: Models with 191 students

Regression analyses performed with a sample of 191 students led to the same conclusions as models with 152 students: none of the ten motivational aspects accounted for additional variance and none of the ten motivational aspects moderated effects of sentence reading fluency, linguistic knowledge and metacognitive knowledge. The effect of motivational aspects also did not differ for readers who varied in reading proficiency level or language background.

Table 5. Fit indices for regression models predicting expository text comprehension with motivational aspects and their interactions with cognitive skills, language background and reading proficiency

Regression models	Models 1a–1j			Models 2a–2j			Models 3a–3j			Models 4a–4j			Models 5a–5j			Models 6a–6j			Models 7a–7j		
Models specification (additional predictor)	+ motivation			+ fluency × motivation			+ vocabulary × motivation			+ knowledge of connectives × motivation			+ metacognitive knowledge × motivation			+ language background (lb) × motivation			+ reading proficiency (rp) × Motivation		
Compared to model	base model[a]			base model + motivation			base model + motivation			base model + motivation			base model + motivation			base model + motivation + dummies lb			base model + motivation + dummies rp		
Difference in *df.*	1			1			1			1			1			2			1		
Model criteria[b]	χ^2	*P*	Δr^2	χ^2	*p*	Δr^2	χ^2	*p*	Δr^2	χ^2	*p*	Δr^2	χ^2	*p*	Δr^2	χ^2	*p*	Δr^2	χ^2	*p*	Δr^2
a. Intrinsic motivation	.08	.78	.00	.02	.89	.00	1.02	.31	.00	.20	.66	.00	1.18	.28	.00	1.10	.58	.01	.59	.44	.00
b. Avoidance	.47	.49	.00	.32	.57	.00	1.04	.31	.01	2.29	.13	.00	.05	.82	.00	1.54	.46	.01	.61	.43	.00
c. Value	.27	.60	.00	.98	.32	.01	3.06	.08	.01	.01	.92	.00	1.76	.19	.01	.74	.69	.01	3.99*	.04	.00
d. Devalue	.22	.64	.00	.79	.37	.01	1.35	.25	.01	.08	.78	.00	.63	.43	.00	.81	.67	.01	.25	.62	.00
e. Self-efficacy	1.04	.31	.00	.71	.40	.00	1.63	.20	.01	.00	1.00	.01	.75	.39	.00	.18	.91	.00	.04	.84	.00
f. Perceived difficulty	.44	.51	.00	.00	1.00	.00	1.60	.21	.00	1.20	.27	.01	1.26	.26	.00	.13	.94	.01	.26	.61	.00
g. Peer value	3.78	.05	.01	.12	.73	.00	.14	.71	.00	1.03	.31	.00	.43	.51	.00	2.77	.25	.00	.01	.92	.00
h. Peer devalue	2.43	.12	.01	.04	.84	.00	.15	.70	.00	1.77	.18	.00	1.17	.28	.00	1.83	.40	.01	.48	.49	.00
i. Preference for challenge	.78	.38	.00	.14	.71	.00	1.93	.16	.01	1.54	.21	.01	.17	.68	.00	1.04	.59	.00	.90	.34	.00
j. Mastery goal	2.59	.11	.01	1.41	.24	.01	1.49	.22	.01	.04	.84	.00	1.56	.21	.00	1.16	.56	.00	1.47	.23	.00
h. Peer devalue	2.43	.12	.01	.04	.84	.00	.15	.70	.00	1.77	.18	.00	1.17	.28	.00	1.83	.40	.01	.48	.49	.00

a. predictors in base model: sentence reading fluency, general vocabulary knowledge, knowledge of connectives and metacognitive knowledge, $\Delta r^2 = .45$. For more information about the base model see Welie et al. (2017).

b. Model criteria: χ^2 = difference in −2 Log Likelihood; *p* = p-value of difference between models; Δr^2 = increase in explained variance.

* $p < .05$.

4. Discussion

The present study examined whether motivational aspects account for additional variance in eighth graders' expository text comprehension, on top of the variance accounted for by cognitive skills. It was also examined whether these motivational aspects moderate the effect of cognitive skills. These two questions were examined for a total of ten motivational dimensions, drawn from various theoretical perspectives. Furthermore, it was assessed whether the predictive value of these motivational aspects differed between poor and good readers, and between monolingual and bilingual Dutch students.

Our findings revealed that none of the ten reading motivations had unique predictive value for expository text comprehension controlling for cognitive skills; neither did motivations have a moderating impact on the contribution of cognitive skills. Furthermore, there were no significant differences between monolinguals and bilinguals in the contribution of these reading motivations to expository text comprehension. The same holds for poor and good readers, with one exception: value related negatively with text comprehension for the poor but not for the good readers. From a theoretical point of view, it is not likely that poor readers who valued expository texts more, scored lower for text comprehension than poor readers who valued these texts less. Although the interaction term reading proficiency x value was significant, no extra variance was explained by this term. For these two reasons, we do not attach much importance to this result.

Our results are in contrast with four previous studies that did find motivational aspects to have predictive value for text comprehension on top of the effect of cognitive skills (i.e., Anmarkrud & Bråten, 2009; Logan et al., 2011; Schaffner & Schiefele, 2013; Taboada et al., 2009). Although these four studies have not established which cognitive skills were affected by motivational aspects, they did find that motivational factors had an additional contribution to text comprehension, when accounting for cognitive skills, and it was argued that this effect reflected that the more motivated readers in these studies employed their cognitive capacities to a greater extent during reading than their less motivated peers.

Based on the fact that motivational aspects did not have predictive value in our study, one may argue that motivational aspects do not contribute to eighth graders' text comprehension as moderators of cognitive skills, as we hypothesized in the introductory section of this chapter. However, we consider this explanation unlikely in the light of studies which have shown motivational differences to be predictive of text comprehension level controlling for cognitive resources (i.e., Anmarkrud & Bråten, 2009; Logan et al., 2011; Schaffner & Schiefele, 2013; Taboada et al., 2009).

A mismatch between students' motivational levels assessed in the motivation questionnaire and their actual motivational levels when taking our reading comprehension test, seems a more reasonable explanation for the lack of motivational contributions to expository text comprehension. More specifically, due to the fact that our participants received education at distinct educational levels, students from different educational levels may have had different reading tasks and texts in mind when filling in the motivation questionnaire, whereas text comprehension was tested with one and the same text comprehension test for all students. Assuming the validity of this explanation, it is unlikely that students' reading motivation levels at their educational level matched their text-specific motivational levels when taking the comprehension test. In future studies, we therefore recommend text specific measurement of motivational aspects, if the sample consists of students who receive education at various educational levels in which reading tasks and tests are tailored to their needs.

When performing additional analyses, we found support for the assumption that there is a discrepancy between students' motivational levels indicated in the questionnaire and their actual motivational levels during testing. These analyses revealed that students from the low educational tracks scored worse than those from the higher tracks on the text comprehension test, whereas there were no differences in motivations to read. Because students from the lower tracks performed worse on the expository text comprehension test, it seems reasonable to assume that they felt less able than their peers from the higher educational tracks to perform the reading tasks in the text comprehension test (self-efficacy), and that they perceived this test as less enjoyable (intrinsic motivation) and more difficult (perceived difficulty). These seemingly contradicting results, then, can be explained by a discrepancy between students' motivational levels assessed in the questionnaire and their test specific motivational levels.

This explanation is also in line with the results of the four studies that did find an additional contribution of motivation (i.e., Anmarkrud & Bråten, 2009; Logan et al., 2011; Schaffner & Schiefele, 2013; Taboada et al., 2009). Although these studies did measure motivation for reading in general or at the genre level (as in our study),[3] there was presumably a correspondence between motivational levels as assessed in the questionnaire and during test taking, since participants in these studies received education at the same level. Therefore, participants in these studies had texts from the same level in mind when asked to indicate their motivational levels in the motivation questionnaire, and these motivational levels probably matched their motivational levels during test-taking to a considerable degree. Correlations between motivational aspects and text comprehension found

3. Except for Schaffner and Schiefele (2013), who measured motivational levels text specifically.

in our study, compared to previous studies, also support the idea that motivational levels while reading a particular text can be measured accurately by genre-specific measurement in a non-stratified school context, but need to be measured text-specific in a stratified school system. That is, Ho and Guthrie (2013) and Wigfield et al. (2012) found self-efficacy and perceived difficulty, assessed for school book expository texts, to be the strongest predictors of expository text comprehension in a non-stratified school context (the United States), whereas in our study self-efficacy and perceived difficulty, assessed in a similar vein for school book expository texts, did not predict expository text comprehension for a sample of students from mixed educational levels.

Apart from the issue of measurement specificity, one may also counter that results in our study are affected by the large number of students excluded due to misbehavior on one or more of the tests. We have shown, however, that results were similar with a slightly larger sample size. More importantly, variance in motivation and text comprehension was not smaller in our study than in other studies: the coefficient of variance for reading motivations ranged from 15.8% to 24.7% in our study, while in other studies it ranged from 17.9% to 32.7% (Anmarkrud & Bråten (2009), 17.9%–26.9%; Ho & Guthrie (2013), 19.9%–32.7%; Logan et al. (2011), 19.8%; Taboada et al. (2009), 24.7%; Wigfield et al. (2012), 19.5%–29.4%). For reading comprehension, the coefficient of variation was 21.2% in our study, while in other studies it ranged from 8.8% to 38.4% (Anmarkrud & Bråten (2009), 38.3%; Ho & Guthrie (2013), 23.2%; Logan et al. (2011), 11.36%; Tabadoa et al. (2009), 8.8%–38.4%).

One remarkable finding in the present study is that bilinguals did not differ from their monolingual peers on self-efficacy and perceived difficulty. As bilinguals are characterized by lower expository text comprehension skills, it could be expected that they perceive expository texts as more difficult and that they have a lower self-efficacy for expository text reading. Reasons for not finding a difference might be that bilinguals may feel overconfident about their text understanding skills (cf., De Milliano, 2013; Salomon, 1984; Sawyer, Graham, & Harris, 1992) or that they hold relatively strong self-efficacy beliefs, as a coping mechanism to persist despite reading difficulties (cf., De Milliano, 2013; Klassen, 2002).

It is important to note that less than half of the total variance in expository text comprehension was explained by the cognitive skills in our sample. These results seem to indicate that, besides linguistic knowledge and metacognitive knowledge, other factors play a key role as well. In this discussion section, we have argued that motivation may account for part of this unexplained variance, but that our measurement of motivation may have hindered us in establishing the impact of motivational processes. Future research with text-specific measurement of motivation in a stratified education context, could clarify whether or not motivational

differences play a role in addition to cognitive skills for secondary school readers' expository text understanding.

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