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# Word Reading Skills and Externalizing and Internalizing Problems from Grade 1 to Grade 2—Developmental Trajectories and Bullying Involvement in Grade 3

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**ABSTRACT**

School bullying is associated with externalizing and internalizing problems, but little is known about whether reading difficulties also play a part. We asked how, in Grades 1 and 2, word reading skills and externalizing/internalizing problems predict the degree to which students are involved in bullying in Grade 3. Using a sample of 480 Finnish children (*M* age = 7 years 2 months at the beginning of the study), developmental profiles were identified using mixture modeling based on reading skills, as well as externalizing and internalizing problems. In Grade 3, one fifth of the students were involved in bullying as victims, bullies, or bully/victims. Poor readers with externalizing/internalizing problems were most involved as bullies and bully/victims but not as victims. Average readers with externalizing/internalizing problems were also involved in bullying, whereas students with only reading difficulties were not. Skilled readers displayed little externalizing/internalizing problems and were not involved in bullying.

Precursors of reading problems as well as timely interventions have been studied extensively (for reviews and meta-analyses, see Bus & van IJzendoorn, 1999; Ehri et al., 2001; Lyytinen, Erskine, Hämäläinen, Torppa, & Ronimus, 2015; Melby-Lervåg, Lyster, & Hulme, 2012; Norton & Wolf, 2012). Less attention has been paid to adverse social experiences co-occurring with reading difficulties (RDs). Students with RDs are more likely than their peers to have poor social skills and social competence (Kempe, Gustafson, & Samuelsson, 2011; Parhiala et al., 2015) and be rejected by their peers (Kiuru et al., 2012; Nabuzoka & Smith, 1993). Poor readers also often feel angry, sad, and unpopular (Morgan, Farkas, & Wu, 2012).

One plausible consequence is that the student becomes involved in school bullying (Cook, Williams, Guerra, Kim, & Sadek, 2010). However, whether it is poor reading skills in particular that lead to bullying involvement has rarely been studied (Turunen, Poskiparta, & Salmivalli, 2017). Moreover, no studies have examined how RDs interplay with externalizing (i.e., conduct problems, aggressiveness, hyperactivity, and antisocial behavior) and internalizing (i.e., depressive symptoms, somatic symptoms, and social anxiety) problems (Beitchman & Young, 1997) to increase the likelihood of being a victim of bullying, a bully, or both (bully/victim).

## *Reading difficulties and bullying involvement*

Bullying is deliberate, repeated aggressive behavior against individuals who cannot readily defend themselves (Olweus, 1999). Examining bullying among heterogeneous groups of students with a variety of learning problems is a common research practice (e.g., Baumeister, Storch, & Geffken, 2008; Estell et al., 2008; Fink, Deighton, Humphrey, & Wolpert, 2015; Glew, Fan, Katon, Rivara, &

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Kernic, 2005; Nakamoto & Schwartz, 2010; Rose, Monda-Amaya, & Espelage, 2011; Saylor & Leach, 2009). However, this research has rarely focused on specific challenges in learning such as RDs, even though these are thought to account for about 80%–90% of all diagnosed learning difficulties (Beitchman & Young, 1997; Lyon, Shaywitz, & Shaywitz, 2003) and would seem to affect overall academic achievement as well (e.g., Hakkarainen, Holopainen, & Savolainen, 2013). Negative memories of being victimized for learning difficulties have emerged in interviews with adults with dyslexia (e.g., Hellendoorn & Ruijssenaars, 2000), whereas studies interviewing dyslexic children and adolescents have reported victimization rates varying from roughly one third (Ingesson, 2007) to 50% (Humphrey & Mullins, 2002), and even 85% (Singer, 2005).

Only one study, it seems, has used comparison groups and community samples to specifically test the association of self-reported RDs with peer-reported involvement in bullying (Turunen et al., 2017). In a large community sample of elementary and middle school students, it was found that more than one third of those with RDs—compared with only about one fifth of those without—were identified by peers as being bullies, bullied, or both. After controlling for the grade level (elementary or middle), gender, self-esteem, and math difficulties, RDs were still associated with victimization (i.e., being a victim or a bully/victim). However, because only self-reports of RDs were used by Turunen et al. (2017), it remains to be determined whether RDs that are more objectively measured would produce the same result.

### *Reading difficulties and externalizing/internalizing problems*

As just stated, evidence of the relationship between reading problems and bullying involvement is scarce. It is known that being a struggling reader is likely to have profound effects on the overall experience of school, making it seem burdensome and aversive, and possibly leading to withdrawal, acting out, and poor general performance (Bennett, Brown, Boyle, Racine, & Offord, 2003; Halonen, Aunola, Ahonen, & Nurmi, 2006; McIntosh, Sadler, & Brown, 2012; Morgan, Farkas, Tufis, & Sperling, 2008). More specifically, many studies have reported increased externalizing problems among poor readers (e.g., Bennett et al., 2003; Fleming, Harachi, Cortes, Abbott, & Catalano, 2004; Halonen et al., 2006; McIntosh et al., 2012; Morgan et al., 2008; Trzesniewski, Moffitt, Caspi, Taylor, & Maughan, 2006; Willcutt & Pennington, 2000), which are commonly associated with bullying perpetration (Cook et al., 2010; Wolke, Woods, Bloomfield, & Karstadt, 2000). In addition, internalizing problems, which may result from poor readers, making unfavorable comparisons with more typical peers (McNulty, 2003), have been reported among students with RDs (e.g., Arnold et al., 2005; Carroll, Maughan, Goodman, & Meltzer, 2005; Dahle, Knivsberg, & Andreassen, 2011; Halonen et al., 2006; Morgan et al., 2008; Mugnaini, Lassi, La Malfa, & Albertini, 2009; Willcutt & Pennington, 2000). Internalizing problems are recognized risk factors for victimization (Cook et al., 2010).

Disruptive and withdrawn behaviors may distract children from instruction and classroom activities, interfering with their ability to learn and leading to delayed reading acquisition and underachievement (Lim & Kim, 2011; McClelland, Acock, & Morrison, 2006). Some studies suggest a reciprocal relationship between reading and problem behaviors, at least for certain students (Morgan et al., 2008; Trzesniewski et al., 2006), or that common cause variables, such as poor attention, may lead to problems in reading, emotions, and behavior (Carroll et al., 2005; Fleming et al., 2004; Willcutt & Pennington, 2000). Another finding is the comorbidity between externalizing and internalizing disorders (Halonen et al., 2006; Lee & Bukowski, 2012).

Our overarching goal is to investigate whether the development of word reading skills together with externalizing and internalizing problems at the beginning of elementary school predict later involvement in school bullying. The analysis is based on a simple model in which RDs and externalizing/internalizing problems accumulate and form a risk of bullying involvement (see, e.g., Evans, Li, & Whipple, 2013; Rönkä, Kinnunen, & Pulkkinen, 2001; Rutter, 1979, 1981; Sameroff, 2006) and co-occur (Morgan et al., 2008; Vaillancourt, Brittain, McDougall, & Duku, 2013). We

hypothesize that depending on the nature of this interplay, the outcome (i.e., bullying involvement) will be different. Eventually, a vicious cycle can be created with externalizing problems increasing the odds of poor readers becoming bullies, whereas poor readers with internalizing problems face the risk of victimization (e.g., Cook et al., 2010).

### *The Present study*

The aim of the present study is thus to investigate how word reading skills and externalizing and internalizing problems in Grades 1 and 2 are associated with involvement in bullying in Grade 3. Instead of using diagnostic cutoff scores, we regarded reading skills and externalizing/internalizing problems as continuous variables. We assessed both fluency and accuracy of decoding, because with transparent orthographies such as Finnish these skills usually develop rapidly. This enabled the total distribution of readers to be studied. A reading comprehension measure was not included, because in the present sample, 65% of the students entered Grade 1 as nonreaders (Niemi et al., 2011). Moreover, in the spring of Grade 1 the average reading comprehension score exceeded the guessing level by less than 1 *SD* (Torppa et al., 2016), indicating that a relatively large subgroup of students performed at a level that is not measurable through the first grade. Hyperactive classroom behavior and conduct problems (as evaluated by the teacher) were taken to indicate externalizing problems, whereas emotional symptoms and peer problems (similarly teacher-evaluated) were seen as internalizing problems—in particular, withdrawal from other children's company.

The following hypotheses were tested:

(1) The strongest predictor of bullying involvement is a combination of externalizing/internalizing problems and RDs. More specifically, externalizing difficulties together with RDs predispose the student to bully others, whereas internalizing difficulties together with RDs increase the risk of victimization.
(2) Solitary externalizing/internalizing difficulties are associated with bullying involvement, albeit to a lesser extent than together with RDs. Students with externalizing problems bully others more often, and those with internalizing problems are victimized more often than students without such problems. RDs in the absence of externalizing/internalizing problems are not associated with bullying involvement.
(3) Bullying involvement is very rare in the absence of externalizing/internalizing problems and RDs.

We first utilized a person-oriented approach (Bergman & Andersson, 2010; Bergman, Magnusson, & El-Khouri, 2003) to reveal individual developmental trajectories in the interplay of reading skills and externalizing/internalizing problems (during Grades 1 and 2). The approach analyses the co-occurrence of RDs, externalizing problems, and internalizing problems simultaneously (see also Viljaranta et al., 2017), and thus makes it possible to test the hypotheses by examining how these developmental trajectories are associated with being a victim, a bully, or a bully/victim in Grade 3.

## Method

### *Participants and procedure*

The present data came from the longitudinal First Steps study (Lerkkanen et al., 2006–2016). A community sample of children were traced from kindergarten (age 6) until the end of Grade 4 (age 10; 2006–2011; $N$ = 1,880). In Finland, children start school in the year they turn 7 years of age. The participants were part of a more intensively followed subsample of 608 students drawn from the previously described community sample (see Figure 1). Because the larger study included children at

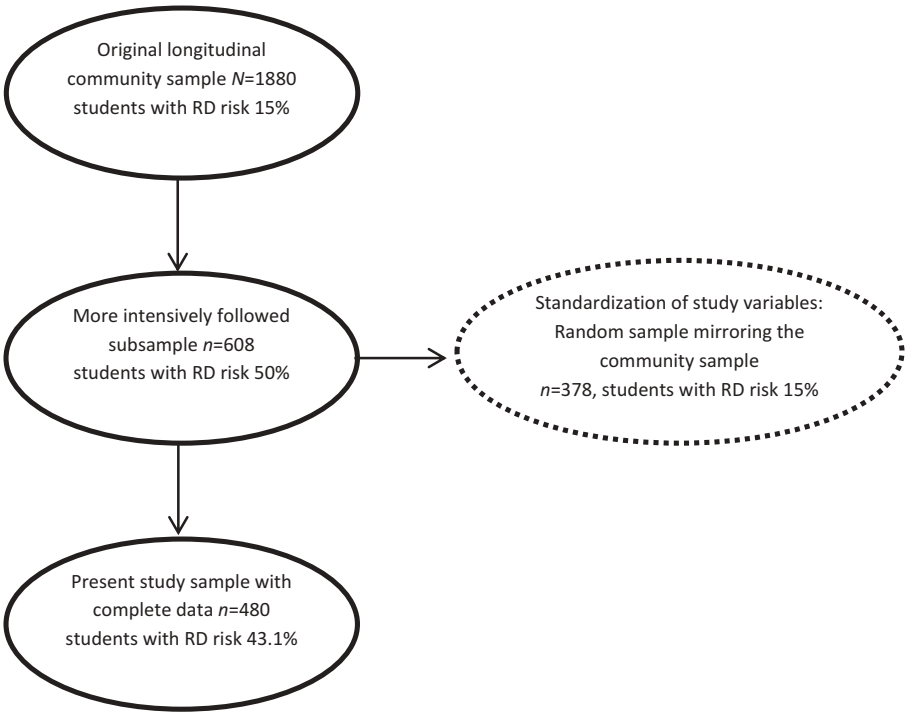


**Figure 1.** The sampling procedure.

risk for RDs, the subsample contained both students at risk (50%) and students not at risk (50%). The RD risk had been determined in kindergarten spring as scoring either under the 15th percentile in at least two out of three prereading skills (phonemic awareness, naming letters, or rapid serial naming), or under the 15th percentile in one of them, and parents reporting reading problems in the family (for details, see Lerkkanen, Ahonen, & Poikkeus, 2011).

This original risk group (50%) made up approximately 15% of the total sample of 1,880 children. Therefore, the standardization of variables used in the present study was based on means and standard deviations of a subsample of 378 children, in which the number of the children with RD risk was randomly drawn to equal 15% (Kiuru et al., 2013). This sample is referred to as a random sample below, and it is representative in regard to the original community sample of 1,880 children (see Zhang et al., 2014).

The present study includes all children out of the 608 who at the end of the third school year (T4, 2010) were in Grade 3, had answered the questions about victimization and bullying others, and whose teacher had reported the child's externalizing/internalizing problems at least once during Grades 1 and 2. These selection criteria led to the final sample of 480 children (218 girls, 262 boys; 43.1% with RD risk and 56.9% without RD risk) and their teachers ($n$ = 130–133) from three medium-sized towns—one in central Finland, one in western Finland, and one in eastern Finland—and one smaller municipality in central Finland. At the beginning of Grade 1 (when this study began), the average age of these children was 7 years 2 months ($SD$ = 3.5 months). It should be noted that the distribution of RD risk students in the final sample differs from that of the intensively followed subsample of 680 students, $\chi^2(1) = 5.08$, $p = .02$.

Parents and teachers gave their written consent to participate. The longitudinal First Steps study (Lerkkanen et al., 2006–2016) has been evaluated and approved by the ethics committee of the University of Jyväskylä (June 6, 2006). The children's reading skills were tested by trained research assistants during school hours in the presence of the classroom teacher. Teachers completed

questionnaires about externalizing/internalizing problems in the fall of Grade 1 (T1; September 2007), spring of Grade 1 (T2; March 2008), and spring of Grade 2 (T3; March 2009). The questionnaires about bullying experiences were answered by the students in the spring of Grade 3 (T4; March 2010).

## Measures

### Reading skills

Reading skills at T1, T2, and T3 were measured with two word-reading tests. Reading 1 is a group-administered subtest of the national reading test (Lindeman, 1998). In this speed test, up to a maximum of 80 trials could be taken within a 2-min time limit. Each trial involves a picture and four phonologically similar words, with the task being to draw a line to match the picture with the semantically matching word. Form A was used at T2, and Form B was used at T1 and T3. The score was the number of correct responses, reflecting both fluency in reading the stimulus words and accuracy in making a correct choice from the alternatives. The data contained individual item scores for a subsample of students ($n$ = 152). The Cronbach's alphas for this subsample were .91 at T1, .93 at T2, and .92 at T3.

Reading 2 (Häyrinen et al., 1999) is a time-limited and individually administered word-list test to assess reading fluency and decoding accuracy. This speed test consists of reading aloud 90 Finnish words in 45 s. These range from simple vowel–consonant–vowel words to multisyllabic words. The same word list was used at T1, T2, and T3, and in each case the number of correctly read words was calculated. The Cronbach's alphas were .97 at T1, .96 at T2, and .96 at T3. The sums of the two different word-reading scores were then standardized according to the distribution of the random sample so that a total word-reading skill variable could be calculated for each time point. The Cronbach's alphas of the sum scores were .92 at T1, .87 at T2, and .80 at T3.

### Externalizing and internalizing problems

Externalizing and internalizing problems were evaluated by teachers at T1, T2, and T3 using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997, 2001). SDQ is a widely used mental health questionnaire for children that correlates highly with other measures of behavioral problems (e.g., the Child Behavior Checklist; Goodman & Scott, 1999; Koskelainen, Sourander, & Kaljonen, 2000). SDQ tests for 25 positive and negative characteristics, divided into five subscales: Hyperactivity, Conduct Problems, Emotional Symptoms, Peer Problems, and Prosocial Behavior. Each item is scored 0 for *not true*, 1 for *somewhat true*, and 2 for *certainly true*, resulting in scores ranging from 0 to 10 for each subscale, with five positively worded items being scored in the opposite direction. In this study, internalizing and externalizing problem scales were used. Both consisted of two subscales, as suggested by Goodman, Lamping, and Ploubidis (2010) for analyses in low-risk samples, and the subscale of Prosocial Behavior was excluded. The subscales of externalizing problems were Hyperactivity and Conduct Problems, and the subscales of internalizing problems were Emotional Symptoms and Peer Problems, with each subscale consisting of five items.

Confirmatory factor analyses were carried out to confirm the expected factor structure of the SDQ scales and subscales. After fixing residual variances of conduct and peer problems factors to zero, and allowing for residual correlations between the same items in T1, T2, and T3, the second-order confirmatory factor model fitted the data well: $\chi^2(1623) = 2730.47$, comparative fit index (CFI) = .91, Tucker–Lewis index (TLI) = .90, root mean square error of approximation (RMSEA) = .04, standardized root mean square residual (SRMR) = .07. The results supported the distinctness of internalizing problems and externalizing problems factors. For the lower level factors, the factor loadings ranged as follows: for Hyperactivity from .66 to .86 in T1, from .61 to .86 in T2, and from .66 to .84 in T3; for Conduct Problems from .17 to .83 in T1, from .35 to .81 in T2, and from .43 to .84 in T3; for Emotional Symptoms from .48 to .75 in T1, from .46 to .75 in T2, and from .48 to .77 in T3; and for Peer Problems from .45 to .72 in T1,

from .41 to .71 in T2, and from .42 to .75 in T3. For the second-order factors, factor loadings ranged for externalizing problems from .76 to 1.00 in T1, from .75 to 1.00 in T2, and from .83 to 1.00 in T3, and for internalizing problems from .50 to 1.00 in T1, from .53 to 1.00 in T2, and from .52 to 1.00 in T3. Externalizing and internalizing problems factors correlated .48 in T1, .50 in T2, and .45 in T3.

Next, the sum scores for internalizing and externalizing problems were formed. The Internalizing Problems subscale was computed as a sum score of Emotional and Peer Problem scales ranging from 0 to 20 with a Cronbach's alpha of .79 at T1, .77 at T2, and .80 at T3. The Externalizing Problems subscale was computed as a sum score of Hyperactivity and Conduct Problem scales ranging from 0 to 20, with a Cronbach's alpha of .90 at T1, .89 at T2, and .90 at T3.

### Bullying involvement

Self-reported bullying and victimization were measured at T4 with the global bullying and victimization items from the revised Olweus Bully/Victim Questionnaire (Olweus, 1996), a single item for each. Bullying was first defined by emphasizing its repetitive nature and the power imbalance between bully and victim; a shortened version of this definition was printed on the self-report questionnaire. The children were asked how often they had been bullied, and how often they had bullied others at school in the last couple of months. They answered on a 5-point scale: 1 (*not at all*), 2 (*only once or twice*), 3 (*two or three times a month*), 4 (*about once a week*), and 5 (*several times a week*). Bullies, victims, and bully/victims were identified by the criteria suggested by Solberg and Olweus (2003). Those who had not bullied others but had been bullied two to three times or more per month were categorized as victims, whereas those who had bullied others but had not been bullied two to three times or more a month were categorized as bullies. Children who reported having both bullied and been bullied two to three times or more a month were categorized as bully/victims. The remaining participants were categorized as uninvolved. Altogether 11.9% ($n$ = 57) were categorized as victims, 4.2% ($n$ = 20) were bullies, 3.7% ($n$ = 18) were bully/victims, and 80.2% ($n$ = 385) were uninvolved. This distribution is in line with previous studies in Finland (Yang, Li, & Salmivalli, 2016), where the prevalence of bullying is close to or somewhat below average in international comparisons (e.g., Richardson & Hiu, 2016; Walsh & Cosma, 2016).

### Analysis strategy

First, to gain descriptive information about how reading skills and externalizing/internalizing problems relate to involvement with bullying, a series of repeated measure analyses of variance (ANOVAs) were calculated, taking into account nestedness due to differences between classrooms by introducing classroom identification number in Grade 3 as a random factor. Because the data did not follow a normal distribution, the results were also checked using nonparametric tests and found to be similar. Furthermore, to meet the necessary criteria for the repeated measure ANOVA, T2 and T3 reading skills, externalizing problems, and internalizing problems were standardized in relation to the corresponding T1 measure of the random sample to reveal possible changes over time.

Second, prepare for testing the hypotheses of the study, a factor mixture analysis (mixture modeling; Lubke & Muthén, 2005) was used to identify subgroups of children based on their word reading skills and externalizing/internalizing problems across Grades 1–2 by using the Mplus statistical package (Version 7.4; Muthén & Muthén, 1998–2015). The COMPLEX command was used to take into account the possible differences between classrooms (Muthén & Muthén, 1998–2015). This estimates the model at the level of the whole sample but corrects for distortions in standard error estimates caused by the clustering of observations (i.e., between-level variation). The scores of reading and externalizing/internalizing problems were standardized according to the distribution of the random sample ($M$ = 0, $SD$ = 1) at each time point. This enabled levels and changes to be interpreted in terms of typical age level. Figure 2 shows the three correlated continuous factors of the tested model, which account for the dependence across time of repeated measurements of the same constructs. The C represents latent classes (i.e., subgroups of children) as represented by the mean values of the variables observed.

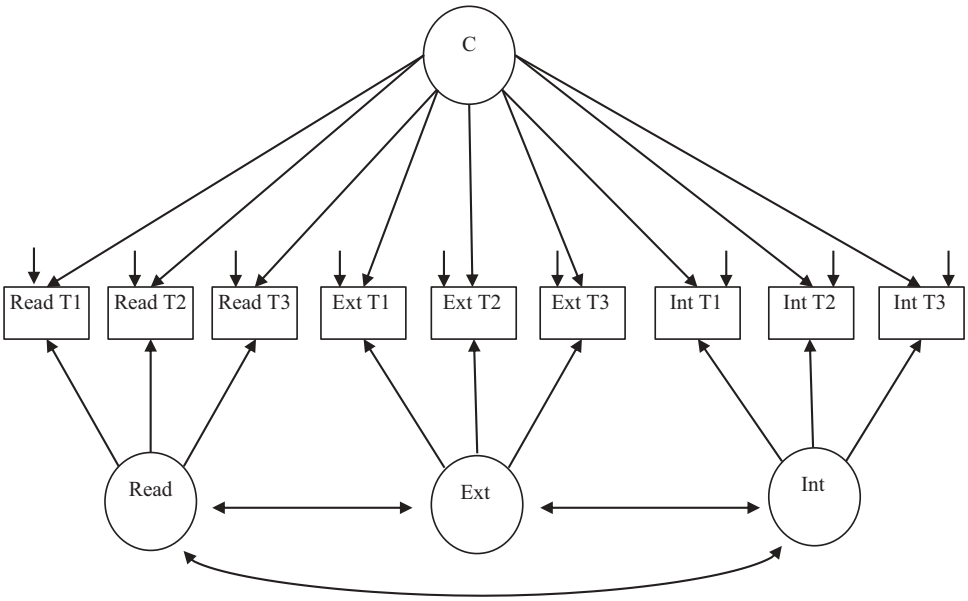


**Figure 2.** The tested factor mixture model.

The factor mixture analysis was estimated using a full information maximum likelihood estimation with robust standard errors, thus using all the data that are available to estimate the model without imputing data. To avoid local maxima, the number of random starting values and iteration rounds were increased according to the Mplus manual (Muthén & Muthén, 1998–2015), and to evaluate the appropriate number of latent subgroups, the following criteria were used. First, the fit of the model was evaluated using four criteria: Akaike's information criterion, the Bayesian information criterion (BIC), a sample-size adjusted BIC, and the Lo–Mendell–Rubin test (Lo, Mendell, & Rubin, 2001). A low Akaike's information criterion, BIC, or adjusted BIC indicate a better model, and significant Lo-Mendel-Rubin test outcomes indicate a larger number of groups. Second, the distinguishability of the latent groups was evaluated with average latent class posterior probabilities and entropy (see also Kiuru et al., 2012). Average latent class posterior probabilities and entropy values range from 0 to 1, where values closer to 1 indicate better classification precision. Third, the usability and interpretability of the latent groups were assessed when deciding their final number.

Finally, to test the three hypotheses and to better understand how developmental subgroups related to the categorized self-reports of bullying involvement, we used cross-tabulations to calculate the standardized residuals for each cell, taking into account the main effects of each.

## Results

### *Descriptive analyses*

Descriptive statistics are presented in Table 1. Both reading scores showed a significant negative correlation with externalizing problems at T1, T2, and T3. They also correlated significantly, although weakly negatively, at T2 with internalizing problems at T2 and T3. However, only the scores from Reading 2 at T2 and T3 correlated negatively (albeit weakly) with bullying at T4. Meanwhile, externalizing and internalizing problems correlated positively with each other at T1, T2, and T3. Because some students were both victimized and bullied others (bully/victims), victimization correlated positively with bullying at T4.

To gain descriptive information about how the bullying involvement groups differ from one another, their reading skills and externalizing/internalizing problems were compared with those of the other groups,

**Table 1.** Intercorrelations (Pearson) and Descriptive Statistics of the Study Variables.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Reading 1 T1 | — | | | | | | | | | | | | | 7.3 | 6.5 |
| 2. Reading 1 T2 | .68*** | — | | | | | | | | | | | | 17.0 | 8.5 |
| 3. Reading 1 T3 | .56*** | .72*** | — | | | | | | | | | | | 23.6 | 7.3 |
| 4. Reading 2 T1 | .85*** | .64*** | .54*** | — | | | | | | | | | | 9.2 | 13.3 |
| 5. Reading 2 T2 | .72*** | .77*** | .66*** | .77*** | —- | | | | | | | | | 25.9 | 11.6 |
| 6. Reading 2 T3 | .55*** | .65*** | .67*** | .58*** | .80*** | — | | | | | | | | 38.8 | 9.4 |
| 7. Ext. T1 | −.23*** | −.22*** | −.16** | −.24*** | −.28*** | −.21*** | — | | | | | | | 4.6 | 4.5 |
| 8. Ext. T2 | −.19*** | −.16** | −.11* | −.21*** | −.25*** | −.19*** | .82*** | — | | | | | | 4.9 | 4.6 |
| 9. Ext. T3 | −.19*** | −.14** | −.10* | −.19*** | −.25*** | −.18*** | .76*** | .84*** | — | | | | | 4.9 | 4.7 |
| 10. Int. T1 | −.07 | −.08 | −.05 | −.08 | −.10* | −.03 | .23*** | .17** | .17*** | — | | | | 3.2 | 3.1 |
| 11. Int. T2 | −.09 | −.09 | −.06 | −.07 | −.09 | −.04 | .20*** | .23** | .19*** | .71*** | — | | | 3.4 | 3.1 |
| 12. Int. T3 | −.06 | −.09* | −.06 | −.04 | −.12* | −.05 | .14** | .12* | .23*** | .59*** | .68*** | — | | 3.3 | 3.2 |
| 13. Vict. T4 | −.00 | .00 | −.01 | −.04 | −.02 | .02 | .14** | .16** | .17*** | .16** | .13** | .20*** | — | 1.7 | 1.1 |
| 14. Bullying T4 | −.05 | −.05 | −.04 | −.08 | −.12** | −.10* | .37*** | .39*** | .37*** | .16** | .16** | .11* | .34*** | 1.4 | 0.8 |

*Note*. T1 = fall of Grade 1; T2 = spring of Grade 1; T3 = spring of Grade 2; T4 = spring of Grade 3; Ext. = Externalizing problems; Int. = Internalizing problems; Vict. = Victimization.
*$p < .05$. **$p < .01$. ***$p < .001$.

controlling for T4 classroom level. More specifically, each target group (bullies only, victims only, and bully/victims) was contrasted with a combined comparison group consisting of the two other groups as well as those not involved with bullying. A series of repeated measure ANOVAs was then carried out for each, that is, 3 (time) × 2 (group). The Greenhouse–Geisser corrections were used, because the sphericity assumption was not met.

### Reading skills

First, the repeated measure ANOVAs revealed the main effect of time, $F(2, 589) = 2125.32$, $p < .001$, partial $\eta^2 = .86$. This indicated that reading skills develop rapidly in Grades 1 and 2, with the development being particularly fast during Grade 1, $F(1, 334) = 3155.06$, $p < .001$, partial $\eta^2 = .90$, and between Grades 1 and 2, $F(1, 334) = 1053.38$, $p < .001$, partial $\eta^2 = .76$. There was also a main effect of group on being a bully, $F(1, 322) = 5.66$, $p = .018$, partial $\eta^2 = .02$, in that bullies in Grade 3 had significantly weaker reading skills than the comparison group. No other main effects as regards the group emerged, however, and there were no interactions involving time and group.

### Externalizing problems

A main effect was found as regards the group for bullies, $F(1, 261) = 10.50$, $p = .001$, partial $\eta^2 = .04$, and for bully/victims, $F(1, 259) = 10.92$, $p = .038$, partial $\eta^2 = .02$, showing that they had significantly more externalizing problems than their respective comparison groups. Grade 3 bullies, in particular, had significantly more externalizing problems, whereas Grade 3 victims did not differ from other groups in externalizing problems in Grades 1 and 2. Of interest, no main effect was found for time, which indicates that externalizing problems did not worsen as the children got older. There were no interactions between time and group.

### Internalizing problems

There was an interaction between time and group, $F(2, 468) = 4.20$, $p = .016$, partial $\eta^2 = .02$. Victims were also the only group for which a main effect was found for time ($F_{2,23} = 6.49$, $p = .005$, partial $\eta^2 = .33$). Children who were victimized in Grade 3 had experienced more internalizing problems in Grade 2 (T3), $F(1, 393) = 5.74$, $p = .017$), but not in Grade 1 (T1 or T2). In other words, the internalizing of problems by victims seemed to increase specifically between T2 and T3, that is, from the spring of Grade 1 to the spring of Grade 2, $F(1, 13) = 8.81$, $p = .011$, partial $\eta^2 = .02$. A main effect was also found concerning the group for bully/victims, $F(1, 259) = 4.35$, $p = .038$, partial $\eta^2 = .02$. Bully/victims had significantly more internalizing problems than others, whereas bullies did not differ from other groups in Grades 1 and 2.

The small sample size did not allow studying the gender-related effects beyond a simple frequency count. The latter showed that girls and boys were equally involved in bullying as victims (32/25) and bully/victims (8/10). However, there was a clear imbalance in the role of the bully (1/19).

## Developmental trajectories of reading skills, externalizing problems, and internalizing problems

Testing the three hypotheses presupposes the specification of individual developmental trajectories in reading ability and externalizing/internalizing problems (during Grades 1 and 2). To this end, all the continuous study variables were standardized in relation to the random sample, which allowed the latent group mean scores to be compared with the population mean scores at each time point. First, to obtain a baseline for evaluating mixture models, a three-factor model was fitted to the data for the whole sample, and it fitted well, $\chi^2(24, n = 480) = 51.22$, CFI = .99, TLI = .98, RMSEA = .05, SRMR = .02. However, because negative residual variances occurred when more classes were added to the mixture model, the residual variance of the reading skill variable at T2 was fixed at 0, and the residual variances of externalizing problem variables at T2 and T3 were made equal (both in the baseline and all

**Table 2.** Information Criteria Values for Different Class Solutions.

| No. of Classes | AIC | BIC | adj. BIC | Group Sizes | Entropy | *p*VLMR | *p*LMR |
|---|---|---|---|---|---|---|---|
| 1 | 8543.75 | 8660.62 | 8571.75 | 480 | | — | |
| 2 | 8374.79 | 8533.39 | 8412.78 | 392/88 | .90 | 0.00 | 0.00 |
| 3 | 8260.76 | 8461.10 | 8308.76 | 314/86/80 | .88 | 0.00 | 0.00 |
| 4 | 8200.68 | 8442.76 | 8258.67 | 276/59/96/49 | .89 | 0.00 | 0.00 |
| **5** | **8143.27** | **8427.09** | **8211.26** | **73/255/87/16/49** | **.91** | **0.00** | **0.00** |
| 6 | 8094.46 | 8420.01 | 8172.45 | 248/86/71/48/10/17 | .91 | 0.00 | 0.00 |

*Note*. Bold values represent selected final model. Dashed *p* is the *p*-value of VLMR and LMR test. AIC = Akaike's information criterion; BIC = Bayesian information criterion; LMR = Lo-Mendell-Rubin likelihood ratio test; VLMR= Vuong–Lo–Mendell–Rubin likelihood ratio test.

subsequent models). After these restrictions, the baseline model fitted the data well, $\chi^2(26, n = 480) = 51.68$, CFI = .99, TLI = .99, RMSEA = .05, SRMR = .02, with the standardized factor loadings varying from.75 to 1.00.

Next, factor mixture analyses were carried out. Table 2 shows the fit indices for models with a different number of subgroups. Both five- and six-group models fitted the data well, as indicated by all the fit indices. However, as adding the sixth subgroup resulted in some extremely small subgroups and did not add anything to the interpretation we chose a five-group solution for the final model.

Both the entropy score (.91) and posterior probabilities (.94, .96, .91, .93, .94) of the final model were high, suggesting good quality of classification and a clear differentiation between the five subgroups thus justifying the choice of the five-group model.

The five subgroups (Figure 3) were labeled:

(1) *Reading below average, externalizing/internalizing problems*: Reading skills were below the average of the random sample in T1, T2, and T3, and the students had considerable externalizing and internalizing problems in T1, T2, and T3 (15.2%).

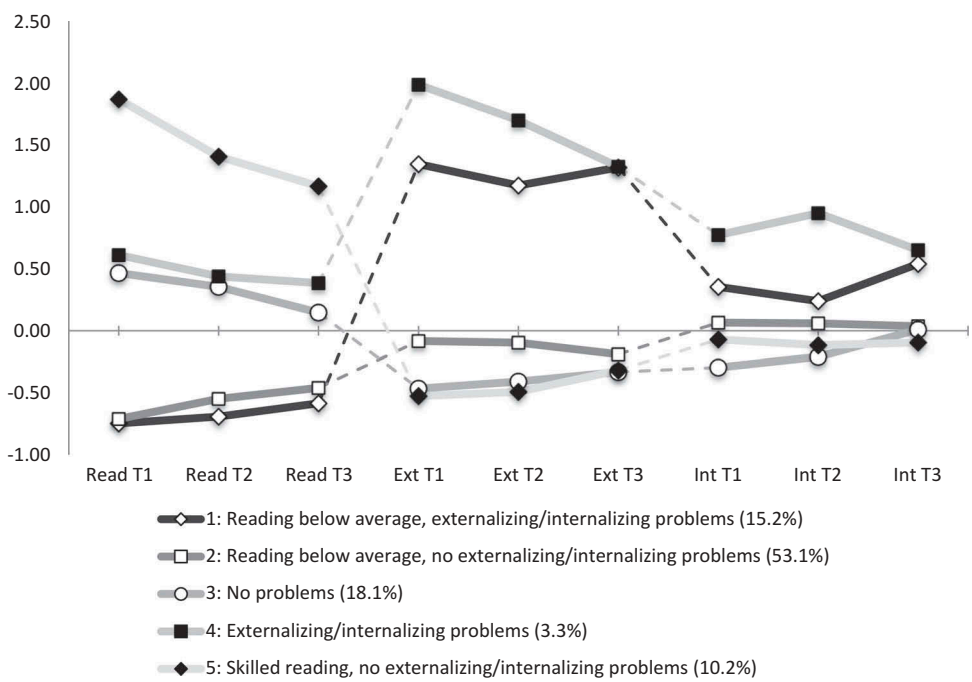


**Figure 3.** Five latent subgroups based on reading skills, externalizing problems, and internalizing problems at T1, T2, and T3.

**Table 3.** Bullying Involvement Among Latent Subgroups.

| Group | Victim *n* (%) *Adj. Residual* | Bully *n* (%) *Adj. Residual* | Bully/Victim *n* (%) *Adj. Residual* | Uninvolved *n* (%) *Adj. Residual* | *N* (%) |
|---|---|---|---|---|---|
| 1. Reading below average, externalizing/internalizing problems | 8 (11.0) −.3 | 8 (11.0) 3.2** | 7 (9.6) 2.9** | 50 (68.5) −2.7** | 73 (100) |
| 2. Reading below average, no externalizing/internalizing problems | 33 (12.9) .8 | 9 (3.5) −.7 | 5 (2.0) −2.2* | 208 (54.0) .8 | 255 (100) |
| 3. No problems | 10 (11.5) −.1 | 2 (2.3) −1.0 | 2 (2.3) −.8 | 73 (83.9) 1.0 | 87 (100) |
| 4. Externalizing/internalizing problems | 4 (25.0) 1.7 | 1 (6.3) .4 | 2 (12.5) 1.9 | 9 (56.3) −2.4* | 16 (100) |
| 5. Skilled reading, no externalizing/internalizing problems | 2 (4.1) −1.8 | 0 (0) −1.5 | 2 (4.1) .1 | 45 (91.8) 2.2* | 49 (100) |
| *N* | 57 | 20 | 18 | 385 | 480 |

*$p < .05$. **$p < .01$.

(2) *Reading below average, no externalizing/internalizing problems*: Reading skills below average in T1, T2 and T3, but neither externalizing nor internalizing problems in T1, T2, and T3 (53.1%).
(3) *No problems*: Reading skills somewhat above average in T1, T2, and T3, and neither externalizing nor internalizing problems T1, T2, and T3 (18.1%).
(4) *Externalizing/internalizing problems*: Reading skills somewhat above average in T1, T2, and T3 but considerable externalizing and internalizing problems in T1, T2, and T3 (3.3%).
(5) *Skilled reading, no externalizing/internalizing problems*: 10.2% could read at T1 and remained clearly above average in T2 and T3, neither externalizing nor internalizing problems in T1, T2, and T3.

### *Developmental trajectories and bullying involvement in Grade 3*

The hypotheses were tested by cross-tabulating the developmental trajectories and bullying involvement groups. Altogether, 19.8% of the students were involved in bullying as victims, bullies, or bully/victims, and 80.2% were uninvolved. A significant dependency was found between the latent profiles and bullying involvement in Grade 3, $\chi^2(12) = 32.41$, $p = .001$ (see Table 3). Examination of adjusted residuals revealed that of the five subgroups: *reading below average, externalizing/internalizing problems* was overrepresented among bullies and bully/victims, partly corroborating Hypothesis 1. In contrast, *students with externalizing/internalizing problems* were underrepresented among the uninvolved, again partly corroborating Hypothesis 2. In accordance with Hypothesis 3, *skilled readers with no externalizing or internalizing problems* were clearly overrepresented among the uninvolved. Of interest, none of the preceding latent subgroups were associated with being a victim.

## Discussion

The aim of the present study was to shed light on the social concomitants of poor reading and explore how the development of decoding and fluency, as well as internalizing/externalizing problems in Grades 1 and 2 of elementary school, are linked to bullying involvement in Grade 3. We drew on a model suggesting that RDs together with externalizing and internalizing problems cumulatively increase the risk of bullying involvement (see, e.g., Evans et al., 2013; Rönkä et al., 2001; Rutter, 1979, 1981; Sameroff, 2006), and these risk factors co-occur (Morgan et al., 2008; Vaillancourt et al., 2013). The focus was placed on the small subset of students involved in bullying

as victims, bullies, or bully/victims. One should bear in mind that about 80% of the students were uninvolved.

The first hypothesis stated that bullying involvement is most strongly predicted by the joint occurrence of RDs and externalizing/internalizing problems. We further predicted that this outcome is modified by RDs jointly occurring with externalizing difficulties increasing the odds for bullying perpetration, and RDs jointly occurring with internalizing difficulties increasing the odds for victimization. This was partly supported. Struggling readers with externalizing/internalizing problems were most often involved in bullying as either bullies, or as bully/victims—the latter being the most maladjusted group (Arseneault et al., 2006; Juvonen, Graham, & Schuster, 2003). Indeed, as Turunen et al. (2017) suggested, RDs may trigger frustration and antisocial behavior in children, and as school becomes increasingly challenging, it starts to become something to be avoided. Such a burden is likely to influence behavior not only toward teachers but also toward peers, resulting in externalizing and acting-out behaviors (Halonen et al., 2006; Morgan et al., 2008), and further bullying others.

Contrary to our expectations, however, none of the combinations of RDs with externalizing/internalizing problems were linked to being a victim. Previous studies have associated victimization with both learning difficulties (Luciano & Savage, 2007; Nabuzoka, 2003) and poor academic achievement (Wang et al., 2014). Recently, Turunen et al. (2017) found that self-reported RDs especially predispose students to victimization. Although common classroom practices, such as reading aloud, group work, and presentations make poor reading clearly noticeable to fellow classmates (Kaukiainen et al., 2002), the results of the present study did not confirm that students with RDs are easy targets for victimization. In previous studies, internalizing problems have been noted as important predictors of victimization (Arseneault et al., 2006; Cook et al., 2010), but in the present sample, there were actually fewer internalizing than externalizing problems (i.e., a lower mean level). One explanation is that mental health promotion is not typically included in teacher education (Askell-Williams & Cefai, 2014). Partly because of this, teachers are less adept at identifying internalizing problems among children (Dwyer, Nicholson, & Battistutta, 2006) as well as adolescents (Undheim, Lydersen, & Kayed, 2016). It is possible that acting-out behaviors at the beginning of elementary school are symptomatic of both behavioral and emotional problems. Teachers have also been observed to quite accurately evaluate externalizing problems, whereas internalizing symptoms are more likely to pass unnoticed (Sourander & Helstelä, 2005).

According to the second hypothesis, solitary behavioral difficulties are also associated with bullying involvement, although to a lesser extent than accumulated problems. Thus, externalizing problems will increase the risk of bullying, internalizing problems will increase the risk of victimization, whereas RDs in the absence of externalizing/internalizing problems are not associated with bullying involvement. Again, this was only partly supported. Internalizing problems did not emerge as an independent factor, distinct from externalizing ones. Moreover, we could not predict being a victim with any of the problem combinations. When externalizing or internalizing problems did occur, they were often accompanied by struggling with reading. Altogether, teachers described almost one fifth of their students as having externalizing/internalizing problems; of this particular quintile, 82% were found to be poor readers and only 18% at least average. The latter students with both externalizing and internalizing problems, but without RDs, tended to be more involved in bullying, as indicated by their underrepresentation in the uninvolved group. The group was too small to establish whether overrepresentation of them would occur in any one of the victim, bully, or bully/victim categories. However, in the descriptive analyses, Grade 3 victims did show more internalizing problems than others in Grade 2 (but not before), suggesting that internalizing problems may explain victimization more as children grow older. In addition, as expected, poor reading without externalizing or internalizing problems did not appear to be a risk factor. Although the descriptive analysis showed that poor reading as such was clearly associated with being a bully, these analyses were conducted without taking into account externalizing and internalizing problems.

In conclusion, only when occurring in tandem with externalizing/internalizing problems—and not on their own—can RDs prove important indicators of bullying involvement among children.

The third hypothesis stated that students without RDs and externalizing/internalizing problems are rarely involved in bullying. This hypothesis was supported. Approximately 10% of students comprised the *skilled readers* group that had neither externalizing nor internalizing problems and was not involved in bullying. Moreover, students in the *no problems* group (18.1%), with above-average reading skills and neither externalizing nor internalizing problems, were rarely involved in bullying. This is in line with other studies suggesting that academic difficulties, problem behavior, and bullying tend to be interlinked (e.g. Cook et al., 2010).

There are four main limitations to this study. First, the sample size was relatively small for the purpose of evaluating a low-frequency phenomenon such as school bullying; only one fifth of the participating students were involved in some capacity. Of these students, only 18 were bully/victims and 20 bullies. Consequently, only cross-tabulation could be used for evaluating bullying involvement among groups identified by mixture analysis. With a larger sample, more complex analysis could have been used, and controlling for other factors, such as gender, intelligence, or parental education, would have been possible. For example, there was a clear imbalance between girls and boys in the simple count of being a bully, but this could not be analyzed further in relation to developmental trajectories. The results must thus be interpreted with caution. A second limitation was the overrepresentation of students at risk for reading failure. Therefore, to avoid biased results, and to use all available data, all continuous variables were standardized in relation to the random sample, where the number of the children at RD risk was randomly drawn to equal 15%. In some respects, however, this can be viewed as a strength, as the biased sample probably helped to identify more students involved in bullying than would have been possible with a random sample of the same size. Third, we did not include reading comprehension among our predictors, because only one third of the students were able to read in T1 (Niemi et al., 2011). Finally, bullying and victimization were measured by single items (Olweus, 1996). Although the measure is quite commonly used in the bullying research, investigating the different forms of bullying could give us more detailed information about bullying among students with RDs.

The current study is the first one to evaluate poor achievement in standardized word reading tests in relation to bullying involvement, as opposed to the self-reports used by Turunen et al. (2017). We also took into account the role of externalizing and internalizing problems, concluding that RDs and externalizing/internalizing problems accumulate and form a risk of bullying perpetration (bullies and bully/victims). The practical implications suggest that poor reading skills alone do not increase the risk of bullying involvement at school; however, they *do* add to the risk comprised by externalizing/internalizing problems of bullying others. It is therefore important to be aware that especially those struggling readers who also act out or withdraw are most likely to be involved in bullying. So far, although evidence-based reading interventions have reported positive literacy outcomes, they usually seem to have had little effect on behavioral or social skills (Roberts, Solis, Ciullo, McKenna, & Vaughn, 2015). However, some evidence suggests that intensive reading instruction may decrease the risk that RDs pose for behavioral problems (McIntosh et al., 2012). On the other hand, effective interventions specifically targeting school bullying exist (Farrington, Gaffney, Lösel, & Ttofi, 2017; Kärnä et al., 2013, 2011). It would be interesting to see if these interventions would also help to alleviate reading problems by promoting students' general well-being and the classroom climate. Another question that merits further investigation is whether whole-school antibullying interventions would decrease victimization and bullying among those at an elevated risk, for instance, students with RDs.

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