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Effects of Implementing Multiple Components in a School-Wide Antibullying Program: A Randomized Controlled Trial in Elementary Schools

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This study investigates the effectiveness of the PRIMA antibullying program for elementary education using a cluster-randomized trial with two experimental conditions (with and without student lessons) and a control group. Students of 31 schools participated in the study (N = 3,135; M_age = 10 years). Multilevel regression analyses demonstrated positive effects of the program on peer-reported victimization and reinforcing behavior. Implementing multiple program components was related to stronger program effects. The results provide partial experimental evidence for the beneficial effects of combining student lessons and teacher training in antibullying programs. Future experimental research is needed to investigate other approaches that reduce not only peer-reported victimization, but also self-perceived bullying and victimization.

Bullying is still a common problem in schools, directly involving many students (Jansen et al., 2012; Mitsopoulou & Giovazolias, 2015; Zych, Ortega-Ruiz, & Del Rey., 2015), and is commonly characterized as repeated and intentional aggressive behavior against a victim who cannot readily defend themselves (Olweus, 1993). Bullying is considered a group process in which students can be involved as a victim, bully, reinforcer, outsider, or defender (Salmivalli, Lagerspetz, Björkqvist, Österman, & Kaukiainen, 1996). Victimized students often develop psychosocial problems, such as low self-esteem, anxiety, and depression (Reijntjes, Kamphuis, Prinzie, & Telch, 2010), and these adverse effects can endure into adulthood (Lund et al., 2008).

Bullying behavior already emerges in early elementary school and negatively influences children’s socioemotional development (Jansen et al., 2012). Gender roles and age influence bullying behavior, with higher bullying scores for boys and younger children (Ladd, Ettekal, & Kochenderfer-Ladd, 2017; Mitsopoulou, & Giovazolias, 2015). Especially from grade 3 onwards, students can understand and reflect on the different aspects of bullying behavior, such as the power imbalance and the intention to harm another (Monks & Smith, 2010; Vlachou, Andreou, Botsoglou, & Didaskalou, 2011). These outcomes indicate the need for early bullying interventions in elementary school and into the years of early adolescence. In addition, several studies found that the trajectories of peer victimization can differ, with some children being bullied heavily throughout the K-12 school period, whereas others are bullied for a shorter period or to a less severe extent (Ladd et al., 2017; Zhou et al., 2020), indicating the need for tailored and selective interventions for specific groups of students in addition to more general and universal interventions (Garandeau & Salmivalli, 2019).

Numerous school-based antibullying intervention programs have been developed and evaluated. Meta-analytic reviews have reported small to moderate effect sizes at the child level, indicating that antibullying programs reduce bullying and victimization rates in elementary schools, although there

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is variation in outcomes (Gaffney, Ttofi, & Farrington, 2019; Jiménez-Barbero, Ruiz-Hernández, Llor-Zaragoza, Pérez-García, & Llor-Esteban, 2016). Many of these programs take a socioecological perspective in targeting the many factors that influence bullying behaviors such as the schools’ policies and procedures, school’s physical environment (supervision by staff, safe places or places of frequent incidents), social environment (school climate/ethos) and engagement with parents, family, and the wider community (Axford et al., 2020; Huitsing, Lodder, Browne, et al., 2020; Limber, Olweus, Wang, Masiello, & Breivik, 2018). Programs with a combination of universal components, targeting all school actors, and selective components, targeting students (at risk of being) involved in bullying situations, have been related to most successful reductions in bullying rates (Ansary et al., 2015; Gaffney et al., 2019). In their meta-analysis, Ttofi and Farrington (2011) found correlational evidence for the effectiveness of specific program components, such as disciplinary methods for bullies, teacher staff training, and parent meetings. Although these correlational findings suggest that some specific program components may be effective in reducing bullying, there is still a lack of experimental evidence for these components’ effectiveness. We need to gain more insight into the effects of antibullying programs and their specific components to open the “black box.”

Two issues seem especially interesting to investigate: The added value of the student curriculum and the effect of adequate implementation of an antibullying program’s component. A student curriculum is a core component in many successful antibullying programs (Ansary et al., 2015). Some student curricula focus on the development of students’ socioemotional skills. One of the aims of the Steps to Respect program, for example, is to strengthen students to recognize the various forms of bullying behavior and the negative consequences of bullying and aspires to train students in empathy, emotion regulation, and conflict resolution skills (Brown, Low, Smith, & Haggerty, 2011; Frey et al., 2005; Low, van Ryzin, Brown, Smith, & Haggerty, 2014). Students learn a variety of social skills and coping skills (e.g., assertiveness, emotion management) to deal with bullying and social situations, which, in turn, helps to prevent bullying. This program showed reductions in bullying and positive effects on bullying prevention factors (Brown et al., 2011). Other programs, such as the KiVa program, include a student curriculum aiming to influence the group dynamics of bullying by creating a strong antibullying norm in the classroom and by empowering students to stop the bullying by targeting outsiders to no longer ignore the bullying when it occurs (Salmivalli et al., 1996; Veenstra, Lindenberg, Huitsing, Sainio, & Salmivalli, 2014). The KiVa program has effectively reduced victimization and bullying (see Huitsing, Lodder, Browne, et al., 2020; Kärnä et al., 2011; Salmivalli, Kärnä, & Poskiparta, 2011; Yang & Salmivalli, 2015). Several other studies have also shown that endorsing a strong antibullying norm is associated with less bullying in the classroom (Marchi, Astor, & Benbenishty, 2007; Troop-Gordon & Ladd, 2015; Veenstra et al., 2014). Student lessons are considered vital because they affect all students directly and may influence students’ norms in the classroom.

In addition to strengthening students through lessons in the classroom, most effective school-wide programs also include various other components that support teachers and other staff members. Teachers are key figures in implementing the core components of antibullying programs, and therefore, teacher training is crucial (Craig, Bell, & Leschied, 2011). Successful antibullying programs also depend on teachers and staff to create and maintain antibullying norms, model positive and prosocial behavior, and encourage students to contribute to a positive class- and school climate. Some programs focus, therefore, also on creating awareness among teachers and staff members to identify bullying and to respond adequately when bullying behavior occurs (van Verseveld, Fukkink, Fekkes, & Oostdam, 2019). Systematic assessments of bullying behavior could help teachers identify bullying because it often happens when adults are not present, and students are reluctant to report bullying (Demaray, Malecki, Secord, & Lyell, 2013; Fekkes, Pijpers, & Verloove-Vanhorick, 2005; Wachs, Bilz, Noproschke, & Schubarth, 2019). Since bullying is considered a group process, it is vital to use a multi-informant instrument that measures bullying and victimization for all students and other students’ roles in bullying behavior (Huitsing & Veenstra, 2012).

Many programs are complex and consist of a mixture of class components and various other, school-wide, and teacher/staff-focused components. Therefore, it is imperative to gain insight into the effectiveness of specific elements. Relatedly, the adequate implementation of individual components is an essential factor for their success (Ttofi & Farrington, 2011). Programs in which multiple individual program components are adequately
implemented are more effective than school-wide programs in which the individual components are implemented with less fidelity (Domitrovich et al., 2008; Durlak & DuPre, 2008). Recent studies have shown a wide variation in the implementation of antibullying programs (Axford et al., 2020; Orobio de Castro et al., 2018), suggesting that this “stacking” of various program components is demanding for school professionals. Program implementation may be affected by the complexity of implementing the many components of a school-wide program, a lack of support and resources given by the school management to teachers, and a high workload and low teacher motivation to implement such a program (Haataja, Athola, Poskiparta, & Salmivalli, 2015; Hall, 2017; Kallestad & Olweus, 2003; Orobio de Castro et al., 2018; Salmivalli, Kaukiainen, & Voeten, 2005). Therefore, investigating the added value of implementing various components is necessary to evaluate and develop antibullying programs in the future.

PRIMA Antibullying Program

PRIMA (VeiligheidNL, n.d.) is a Dutch multi-component antibullying program for elementary education, based initially on the Olweus Bullying Prevention Program (Olweus, 1993). Based on the socioecological model (Hong & Espelage, 2012), PRIMA focuses on three levels in the school: the individual child, the classroom, and the school. In addition, parents are informed about the preventive antibullying policy and are involved when a bullying situation concerns their child. PRIMA’s primary goal is to ensure a prosocial and safe school climate in which students treat each other with respect.

A national antibullying committee has accredited an earlier version of PRIMA (Orobio de Castro et al., 2018). This study reported that after 1 year of implementation, PRIMA was effective in reducing bullying and victimization. Also, students reported lower levels of depressive symptoms compared to students in control schools.

The PRIMA program was extended in 2017 by including new knowledge and tools related to the group process of bullying and creating a positive group norm in the classroom (Huitsing, & Veenstra, 2012; Salmivalli et al., 1996). The program was also adapted to better meet teachers and staff members’ needs by providing more information and strategies to support them in identifying and addressing bullying behavior.

Students of all elementary school grades receive a student lesson curriculum, including 6 weekly 45-min lessons at the beginning of the school year and two lessons to refresh their knowledge and skills for the remaining year. The lessons pursue to prevent and address bullying together with students by focusing on the following three goals: (a) making students aware of the negative consequences of bullying and their role in bullying situations; (b) strengthening positive antibullying norms in the classroom and teaching students strategies to stand up against a bullying norm; and (c) increasing prosocial skills and promoting positive relations among students. The lessons consist of assignments on class, small-group, and individual levels and are supported by videos. The repetition of the student lessons in consecutive school years, adapted to the developmental changes across the K-12 years, aims to create a continuous learning curve in which students become familiar with the program norms and values (Craig et al., 2011; Kärnä et al., 2013).

All school professionals follow a 2-hr e-learning module independently. Teachers are taught different skills that enable them to identify, prevent, and reduce bullying adequately. The e-learning aims to (a) increase teachers’ and staff members’ awareness and responsiveness to bullying; (b) encourage them to model prosocial and positive behavior; (c) help them create and maintain antibullying norms actively; and (d) support them in the implementation process of the program. Teachers are instructed on how to implement the monitor instrument and recognize the risk factors of victimized students. Methods to respond to bullying include strategies at the class level (e.g., guidelines to create an antibullying norm in the classroom and a positive climate), and strategies at the individual and parent level (e.g., guidelines to talk with victims, bullies, and their parents). In line with the e-learning module, teachers participate in a face-to-face training session from a certified PRIMA-coach to practice strategies that have been introduced in the e-learning module using fictional cases of bullying or bullying situations that occur in teachers’ classes. Finally, the training aims to further support staff members in implementing the PRIMA components by discussing school-specific facilitators and barriers.

The monitor aims to provide teachers insight into students’ roles in bullying behavior, students’ perception of the classroom climate, their social status, and mutual friendships, using a multi-informant approach. The monitor also aims to provide teachers with information about individual students directly involved in bullying situations or students at risk. Teachers in Grades 3–6 receive a report twice a year, following from the administration of
involved in bullying.

focus on students who are (at risk of being)

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cused components (hereafter: PRIMA-L

teacher-focused components and without the stu-

students in the other experimental condition

praga teachers. The protocols for speci-

tal protocols for students involved in bullying

situation for students

All school professionals receive access to digital

protocols providing guidelines on how to deal with

specific bullying situations, such as dealing with
cyber bullying, or lonely and victimized students

(see van Verseveld, Fekkes, Fukkink, & Oostdam,

2020). Therefore, the protocols support teachers to

intervene more effectively in bullying situations

that teachers themselves considered to be difficult.

The student curriculum, e-learning module, face-
to-face training, and the monitor report are preven-
tive, universal components for all students and

teachers. The protocols for specific bullying situa-
tions and the protocols following from the monitor

results are selective, curative, components, and

focus on students who are (at risk of being)

involved in bullying.

The Present Study

This study aims to evaluate the effectiveness of

the new PRIMA program. Students received the

PRIMA program in one experimental condition,

including the lessons for students and teacher-focu-
sed components (hereafter: PRIMA-L[^1]), whereas

students in the other experimental condition

received the PRIMA program, including only the

teacher-focused components and without the stu-
dent lessons (hereafter: PRIMA-L[^-]). As the primary

outcomes, we used self-reported and peer-reported

bullying and victimization. We hypothesized a

stronger decrease in bullying and victimization in

PRIMA-L[^+] schools than PRIMA-L[^-] schools (H1) as

our primary research question. In addition, we

evaluated the effects of stacking the universal pro-

gram components of PRIMA across conditions. We

hypothesized a stronger decrease in bullying and

victimization when teachers implemented more uni-

versal program components (H2). In an explorative

fashion, we investigated the effects of both exper-

imental conditions and the effects of stacking uni-

versal program components on the roles of

reinforcers, outsiders, and defenders.

Method

Sampling and Design

We conducted a power analysis based on self-

and peer-reported victimization as an outcome

measure. Since the prevalence of bullying in Grades

3–6 varies between 21% and 35% in western coun-

tries (Chester et al., 2015; National Center for Edu-
cational Statistics, 2019), we estimated that a

minimum of 33 classes per condition was needed

with a minimum of 25 students per class (assuming

a response of 80%; \( \alpha = .05 \), two-sided, power = .80,

ICC = .032) to demonstrate a decrease of 30% of

victims (i.e., from 25% to 17.5%) between the two

experimental groups and the control group. With

this sample size, a small effect (Cohen’s \( d = .20 \)) can

be demonstrated for primary and secondary mea-

sures with adequate power.

A cluster-randomized controlled trial was

applied with a pretest and posttest and an 1:1:1

allocation ratio, comparing two experimental con-

ditions with a control group. We selected 354 ele-

mentary schools from a database of all Dutch

elementary schools and assessed them for eligibility

to participate in this study based on the following

inclusion criteria: (a) the schools contained more

than 50 students; (b) schools were not already using

an antibullying prevention program; (c) schools

were not participating in any other study in this

area; (d) schools were willing to receive additional

information about the study. A total of 173 schools

met the inclusion criteria. After stratifying schools

by school size, the number of special needs students

in the school, and the urbanization level of

the school’s location, schools were randomly

assigned to one of the two experimental conditions

or the control group. In the PRIMA-L[^+] condition,
schools received all PRIMA program core compo-
nents, including the student lessons. In the PRIMA-

L[^-] condition, schools received all PRMA core com-
nents, except for the student lessons. This design

makes it possible to determine the effect of a tea-
ger approach (PRIMA-L[^-] vs. control) and the

additional effect of the student curriculum (PRIMA-

L[^-] vs. control).

After allocation to research conditions, letters

were sent to schools from January to July 2017 to

invite them to participate in the study. Intervention

schools received free access to PRIMA, free coach-
ing of a certified coach during the trial, and mone-
tary compensation of €700. Control schools received

a free PRIMA pilot without a certified coach after

the trial (i.e., waitlist condition) and €1,000. We

informed schools about their assignment
(intervention arms or control arm) in September 2017. One of the researchers remained blind to school allocation and led the assessment of the study’s outcomes. Figure 1 provides an overview of the school and participant enrollment in the trial. A total of 31 schools participated in the study: nine schools in the PRIMA-L\(^+\) condition, 10 schools in the PRIMA-L\(^-\) condition, and 12 schools in the control group.

**Participants**

The 31 participating schools included 174 classes representing 4,285 students in Grades 3–6 who were eligible for participation in the study. Parents gave written permission for the participation of a total of 3,135 students (73.2% of the initial sample, \(M_{\text{age}} = 10.00, SD = 1.21\)). We also obtained active, informed consent from the teachers to participate in the trial. In all groups, an approximately equal percentage of students participated in the trial (PRIMA-L\(^+\) condition: 70.7%; PRIMA-L\(^-\) condition: 79.5%; and control condition: 69.1%). The PRIMA-L\(^+\) condition comprised 873 students (\(M_{\text{age}} = 9.97, SD = 1.23\)), the PRIMA-L\(^-\) condition had 982 students (\(M_{\text{age}} = 10.05, SD = 1.17\)), and the control condition contained 1,389 students (\(M_{\text{age}} = 9.98, SD = 1.21\)). Of the 3,135 students, 52.4% were girls, 46.8% boys, and 0.8% had missing data on this variable (see Table 1). Most students (75.9%) had a western background, and a smaller proportion had a non-western background (22.8%). Of 1.3% of the students, this information was missing.

Students between conditions did not differ significantly in age, \(F(2, 3093) = 1.43, p = .241\) or gender, \(\chi^2(1) = 1.11, p = .574\). However, there was a significant difference in ethnicity, \(\chi^2(2) = 17.60, p < .001\), with a smaller proportion of students with a non-western background in the control group. We controlled for this variable in our analysis. Attrition at the posttest was not different for the three conditions on self-report measures. For peer-reports, conditions differed significantly, \(\chi^2(2) = 8.57, p = .014\), with slightly less attrition in the control schools (7.0%) compared to the experimental schools (9.6%). A nonresponse analysis indicated there was no selective attrition. Students who did not participate in the posttest did not differ significantly in any pretest outcome measures compared to students who did participate. The 174 classes represented 312 teachers, 82 teachers in the PRIMA-L\(^+\) condition, 91 in the PRIMA-L\(^-\) condition, and 139 in the control condition.

**Procedures**

We visited each participating school to explain the data collection procedure at the start of the school year in September 2017. Data were collected at the pretest in October-November 2017 and the posttest in March-April 2018. During each wave of data collection, students completed two online questionnaires during school hours. Two researchers instructed students on how to complete the questionnaire and ensured students’ privacy during the administration. Researchers also explained that students’ answers would remain confidential within the classroom.

After the administration of the pretest, schools received access to the program materials. The research team instructed school teachers and principals to deliver the program as follows: (a) Consulting the monitor report, and participating in the e-learning and face-to-face training (November/December 2017); (b) Delivering student curriculum for PRIMA-L\(^+\) schools (December 2017/January 2018); (c) Implementing protocols for students (at risk of being) involved in bullying situations or for specific bullying situations if required. Students in the PRIMA-L\(^-\) were exposed to the program directly through the student curriculum, whereas students in the PRIMA-L\(^-\) schools were exposed only indirectly through the teacher being exposed to teacher-focused components. Control schools offered “care as usual,” which means that they implemented nationally established antibullying guidelines, such as monitoring students’ well-being at school, having an antibullying coordinator, and having a social safety policy. Control schools were interviewed by telephone at the beginning and end of the data collection period to monitor whether they were running a school-wide antibullying program. None of the 12 control schools carried out an antibullying program during the trial period. Ethical approval was granted by the Faculty of Social and Behavioral Sciences’ ethical board at the University of Amsterdam (file number 2017-CDE-8008), and the trial has been registered in the ISRCTN register (file number 15425978).

**Measures**

As formulated in the Revised Bully/Victim Questionnaire (OBVQ) of Olweus (1996), a definition of bullying was presented in the questionnaire, emphasizing the repetitive and intentional nature of bullying and the imbalance of power between the bully and victim. A description of the different forms of bullying was also given, including overt...
**Figure 1. Flowchart of school enrollment in the study.**
forms of bullying (e.g., verbal, physical, threatening), covert forms (e.g., social exclusion, gossiping), and digital bullying (e.g., on social media, internet).

We measured bullying and victimization with both self and peer reports. Self-reports are the standard for prevalence estimation and measurement of change (Olweus, 2013). Using self-reports, we can measure how children experience bullying/victimization themselves. Peer-reports are valuable since a multi-informant approach gives a more refined opportunity to measure how observed bullying occurs in a classroom (Kärnä et al., 2011).

Self-Reported Victims and Bullies

We used the global item from the revised OBVQ (Olweus, 1996) to measure self-reported victimization: “How often have you been bullied at school in the last couple of months?”. Students answered on a 5-point scale (0 = not at all, 1 = once or twice, 2 = two or three times a month, 3 = about once a week, 4 = several times a week).

Self-reported bullying was measured by asking students whether they had engaged in a series of behaviors often associated with bullying in the last couple of months. Students responded to items on a 5-point scale (0 = not at all, 1 = once or twice, 2 = two or three times a month, 3 = about once a week, 4 = several times a week). These eight items were based on the OBVQ (Olweus, 1996) and had an internal consistency of $\alpha = .882$ at the pretest. We have chosen to measure self-reported bullying more subtly through eight related behaviors because children often underreport their bullying behavior due to self-protecting mechanisms (Kosir et al., 2019).

Peer-Reported Victims and Bullies

Based on the Participant Roles Questionnaire (PRQ; Kärnä et al., 2013; Salmivalli et al., 1996), two single items were used to identify peer-reported victimization and bullying. Students were asked to nominate students who were being bullied in the past couple of months from a list of classmates: “Which children are being bullied by other children?”, and to nominate students who bullied other children: “Which classmates bully other children?”. Students could nominate an unlimited number of classmates for each item or nominate no one. To prevent a systematic nomination bias of classmates on top of the list, the order of student names was randomized. Received peer nominations were totaled and divided by the number of classmates responding, resulting in a proportion score ranging from .00 to 1.00 for each student on each item.

Peer-Reported Reinforcers, Outsiders, and Defenders

Also based on the PRQ (Kärnä et al., 2013; Salmivalli et al., 1996), three single items were used to identify students’ participant roles in bullying situations concerning the past couple of months; reinforcers of bullies: “Which classmates reinforce bullies, for example, by laughing or giggling when someone gets bullied?”; outsider: “Which classmates do nothing when someone gets bullied, for example, they walk away or act like they did not see the bullying?”; and defenders of victims: “Which classmates help children that are being bullied, for example, by comforting, supporting, or defending them?”. Similar to the procedure for peer-reported bullies and victims, students could nominate an unlimited number of classmates or no one. The list of names was randomized, and proportion scores were calculated for each role.

Stacking of Program Components

To investigate the effects of stacking components, we calculated and dichotomized each program component’s implementation level. First, teachers were asked to indicate the degree to which they implemented each part (e.g., Lesson 1, Lesson 2, etc.) of each PRIMA component (e.g., student lessons) separately on a 4-point scale: 0 = not at all; 1 = less than 50%; 2 = more than 50%; 3 = completely. We subsequently dichotomized the scores to indicate whether students (or their teachers) were sufficiently exposed to each program component. Regarding the universal program components, we
considered an implementation of at least 50% of the components to be a successful implementation of student lessons, e-learning, and the monitor report. The face-to-face training was completed when teachers indicated that they attended the full training session. Concerning the selective components, the protocols for specific bullying situations and the protocols for students directly involved were used when teachers indicated to have consulted at least one of the protocols for both types of protocols separately.

We determined the PRIMA program’s universal components’ implementation level by adding the dichotomized variables of student lessons, monitor-report, e-learning, and face-to-face training together into an aggregated implementation score. This resulted in the following scores: 0 = no components implemented; 1 = one component; 2 = two components; 3 = three components, or 4 = four components. We included these components as they are universal; the use of the selective components (i.e., protocols resulting from the monitor and the protocols for specific situations) heavily depends on specific bullying incidents at school. Therefore, the implementation of selective components is highly context-specific, and its interpretation is, therefore, less straightforward.

Program Dosage

In addition to a dichotomous measure of implementation, we also used a continuous measure by calculating the number of hours performed for implementing the different components. Using teachers’ reports on the extent to which they have implemented each component, we have estimated the average time spent on each program component. This procedure resulted in a possible program dosage ranging from 0 to 9 hr (i.e., student lessons: 0–4.5 hr; monitor report: 0–0.5 hr e-learning: 0–2 hr; and face-to-face training: 0–2 hr).

Demographic Information

Students reported their date of birth, gender, grade level, and ethnicity. Ethnicity was measured by asking what the student considered his or her background with the possibility to tick multiple options (e.g., Dutch and Moroccan). We then dichotomized students into “western” or “nonwestern” background, based on the criteria of the Dutch Central Statistical Office (Centraal Bureau voor de Statistieken (Dutch Central Statistical Office), n.d.).

Statistical Analysis

We used multilevel modeling with SPSS version 25 (IBM Corp, 2017). Three-level hierarchical models were fitted, representing students nested in classrooms and classrooms nested within schools. We controlled for differences in baseline levels by adding the pretest scores of the variable of interest. Also, ethnicity (i.e., western or nonwestern), gender, and age (grand-mean centered) were included in all models, as these are well-known covariates (see Salmivalli & Voeten, 2004; Vervoort, Scholte, & Overbeek, 2010). We explored possible interaction effects of both PRIMA conditions with ethnicity, gender, or age. Finally, we controlled for differences across conditions on school size, urbanization level, and the number of students with special needs with dummy-coded school-level variables, distinguishing between large schools (> 500 students), urban schools (large and medium cities), and high level of students with special needs (above the national average of 9.31% students with learning difficulties or emotional-behavioral problems but without an indicated disability or health care need, see Smeets, van der Veen, Derriks, & Roeleveld, 2007).

To investigate the effects of both PRIMA conditions on bullying behavior and students’ roles in bullying situations, we tested a model including all 3,155 students (i.e., intention-to-treat analysis). This analysis estimates the program effects in general school practices with varying program implementation levels to establish typical effects in educational practice. We also analyzed the data to include only those students who were sufficiently exposed to at least one of the universal PRIMA components (i.e., a received-intervention analysis). To investigate whether classes that implemented one, two, three, or four universal program components showed more positive results, we compared these subgroups with classes that implemented zero universal program components, including the control group. In addition, we investigated whether program dosage was related to program effects.

Results

Table 2 provides an overview of pre and posttest scores and prevalence changes in mean proportion scores for students’ roles in bullying situations. Pretest scores showed that 14.3% of the students (n = 452) reported being victimized at least twice a month. For self-reported bullying behaviors, 9.5% (n = 261) of the students scored an average of 6 or
higher on performing different aggressive behaviors (e.g., kicking or excluding a peer) in the past 3 months. Self-reported victims declined in all three groups, and the largest decline was observed in PRIMA-L+ schools. Also, self-reported bullies increased in all groups, again with the most considerable change in the PRIMA-L+ schools. The proportion of the number of nominations for victims decreased significantly from .635 to .450. The number of nominations, therefore, decreased by 20% in this group. Peer-reported bullies increased in all three groups, with the largest increase in the control group.

Regarding students’ roles in bullying situations, the majority of the students received nominations for the role of defender (M = .20), followed by outsider (M = .07), and reinforcer (M = .06) at the pretreatment (see Table 2). The prevalence of the number of peer-reported defenders, outsiders, and reinforcers increased across all three groups.

**Outcomes of the Intention-to-Treat Analysis**

We found a statistically significant difference between PRIMA-L+ schools and the control schools on peer-reported victims (see Table 3). PRIMA-L+ schools had a significantly lower number of peer-reported victims than control schools, b = −.029, SE = .010, p = .008, 95% CI [−.05, −.01]. Using the differences in adjusted mean proportion scores of the PRIMA-L+ schools and control schools, we observed a small effect of PRIMA-L+ on reducing peer-reported bullying (d = −.17).

The intention-to-treat analysis showed no significant differences in the number of self-reported victims and bullies and the proportion scores for the roles of reinforcers, outsiders and defenders between both PRIMA conditions and the control condition. No significant interaction effects were found for PRIMA with gender, age, or ethnicity.

**Implementation Level of PRIMA Components**

Teachers in the PRIMA-L+ schools implemented universal and selective program components more intensively than teachers in the PRIMA-L− schools (see Figure 2). In both conditions, the PRIMA monitor report and protocols were used in most classes (n = 56 and n = 55, respectively). The protocols for specific bullying situations were least consulted in both conditions (n = 32). Teachers in the PRIMA-L+ schools delivered an average of 5.32 hr (SD = 2.86) of the program, whereas teachers in the PRIMA-L− schools delivered an average of 2.10 hr (SD = 1.67) of the program.

Table 4 provides an overview of the number of universal components implemented by teachers. The majority of the teachers (49 in 26 classes of 548 students) in interventions schools (i.e., PRIMA-L+ and PRIMA-L−) implemented two universal components. Most teachers carried out a combination of a training component (i.e., e-learning or face-to-face training) and the monitor report. One-fifth of the teachers implemented none of these components, indicating that none of these students were (in)directly exposed to the universal PRIMA components.

<table>
<thead>
<tr>
<th>PRIMA-L+</th>
<th>PRIMA-L−</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>T2</td>
<td>CS</td>
</tr>
<tr>
<td>Victims</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report</td>
<td>0.635 (1.210)</td>
<td>0.450 (1.018)</td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.051 (0.085)</td>
<td>0.041 (0.082)</td>
</tr>
<tr>
<td>Bullies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report</td>
<td>2.029 (3.041)</td>
<td>2.223 (2.989)</td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.063 (0.100)</td>
<td>0.078 (0.187)</td>
</tr>
<tr>
<td>Reinforcers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.064 (0.083)</td>
<td>0.075 (0.153)</td>
</tr>
<tr>
<td>Outsiders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.074 (0.062)</td>
<td>0.124 (0.142)</td>
</tr>
<tr>
<td>Defenders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.208 (0.126)</td>
<td>0.314 (0.317)</td>
</tr>
</tbody>
</table>

Note. Victims self-report N = 2,774; bullies self-report N = 2,473, peer-report N = 2,767. CS = change score (computed as T2-T1).
### Table 3

Estimates for Intention-to-Treat Intervention Effects of PRIMA on Students’ Roles in Bullying Situations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
<td>SE</td>
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</tr>
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<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Intercept</td>
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<td>0.04</td>
<td>0.54***</td>
<td>0.06</td>
<td>0.06***</td>
<td>0.05</td>
<td>0.06***</td>
<td>0.05</td>
<td>0.06***</td>
<td>0.05</td>
<td>0.06***</td>
<td>0.05</td>
<td>0.06***</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>0.029</td>
<td>0.028***</td>
<td>0.04</td>
<td>0.032***</td>
<td>0.029</td>
<td>0.031***</td>
<td>0.046</td>
<td>0.041***</td>
<td>0.036</td>
<td>0.042***</td>
<td>0.029</td>
<td>0.041***</td>
<td>0.036</td>
</tr>
<tr>
<td>PRIMA-L</td>
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<td>0.04</td>
<td>0.032***</td>
<td>0.029</td>
<td>0.031***</td>
<td>0.046</td>
<td>0.041***</td>
<td>0.036</td>
<td>0.042***</td>
<td>0.029</td>
<td>0.041***</td>
<td>0.036</td>
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<tr>
<td>Pretest score</td>
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<td>0.015***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
</tr>
<tr>
<td>Boy</td>
<td>0.014</td>
<td>0.003**</td>
<td>0.012***</td>
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<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
<td>0.002***</td>
<td>0.012***</td>
</tr>
<tr>
<td>Age</td>
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<td>-0.068***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
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<tr>
<td>Normal western</td>
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<td>-0.068***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
<td>-0.046***</td>
<td>-0.003***</td>
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<tr>
<td>Large schools</td>
<td>-0.094</td>
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<td>-0.045***</td>
<td>-0.003***</td>
<td>-0.045***</td>
<td>-0.003***</td>
<td>-0.045***</td>
<td>-0.003***</td>
<td>-0.045***</td>
<td>-0.003***</td>
<td>-0.045***</td>
<td>-0.003***</td>
<td>-0.045***</td>
</tr>
<tr>
<td>Urban area</td>
<td>-0.089</td>
<td>-0.075***</td>
<td>-0.056***</td>
<td>-0.013***</td>
<td>-0.056***</td>
<td>-0.013***</td>
<td>-0.056***</td>
<td>-0.013***</td>
<td>-0.056***</td>
<td>-0.013***</td>
<td>-0.056***</td>
<td>-0.013***</td>
<td>-0.056***</td>
</tr>
<tr>
<td>Special needs students</td>
<td>-0.093</td>
<td>-0.064***</td>
<td>-0.052***</td>
<td>-0.012***</td>
<td>-0.052***</td>
<td>-0.012***</td>
<td>-0.052***</td>
<td>-0.012***</td>
<td>-0.052***</td>
<td>-0.012***</td>
<td>-0.052***</td>
<td>-0.012***</td>
<td>-0.052***</td>
</tr>
<tr>
<td>Random effects</td>
<td>-0.046</td>
<td>-0.095***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
</tr>
<tr>
<td>Random effects</td>
<td>-0.046</td>
<td>-0.095***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
<td>-0.062***</td>
<td>-0.025***</td>
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<td>Group level</td>
<td>0.015</td>
<td>0.007***</td>
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<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
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<tr>
<td>School level</td>
<td>0.010</td>
<td>0.007***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
<td>0.002***</td>
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<td>0.002***</td>
<td>0.002***</td>
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<td>0.002***</td>
</tr>
</tbody>
</table>

Note. Victims self-report N = 2,774, bullies self-report N = 2,473, peer-report N = 2,767. AIC = Akaike information criteria. *p < 0.05, **p < 0.01, ***p < 0.001.
Outcomes of the Received Intervention Analysis

Removing students who did not receive the universal PRIMA components from the analyses showed similar patterns in pre and posttest scores and changes in mean (proportion) scores compared to descriptive analyses, including all students (see Table 5). The proportion of the number of nominations for victims decreased by 28% in the PRIMA-L* group. As expected, effects in the PRIMA-L* schools were stronger (see Table 6). Compared to the control group, the mean proportion scores for peer-reported victimization declined in PRIMA-L* condition, $b = -0.034$, $SE = 0.011$, $p = 0.005$, 95% CI [−0.06, −0.01], Cohen’s $d = -0.17$.

Contrary to the intention-to-treat analysis, we found a significant decrease in the mean proportion scores for peer-reported reinforcing behavior in the PRIMA-L* schools compared to control schools, $b = -0.0354$, $SE = 0.016$, $p = 0.044$, 95% CI [−0.068, −0.001], Cohen’s $d = -0.11$.

To conclude, the received intervention analysis demonstrated the decline in peer-reported victims more convincingly for the PRIMA-L* schools and revealed additional effects for the PRIMA-L* school on peer-reported reinforcers, compared to the intention-to-treat analysis. There were no significant differences in the number of self-reported victims and bullies and the number of outsiders and defenders between PRIMA conditions and the control condition. Also, no significant interaction effects were found for gender, age, or ethnicity.

Table 4

<table>
<thead>
<tr>
<th>Number of Universal Components Implemented by Teachers</th>
<th>Number of classes ($n$)</th>
<th>Number of teachers ($n$)</th>
<th>Number of students ($n$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero components implemented*</td>
<td>19</td>
<td>37</td>
<td>343</td>
</tr>
<tr>
<td>One component implemented</td>
<td>15</td>
<td>32</td>
<td>303</td>
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<tr>
<td>E-learning</td>
<td>3</td>
<td>6</td>
<td>57</td>
</tr>
<tr>
<td>Training</td>
<td>3</td>
<td>5</td>
<td>63</td>
</tr>
<tr>
<td>Student lessons</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Monitor report</td>
<td>9</td>
<td>21</td>
<td>183</td>
</tr>
<tr>
<td>Two components implemented</td>
<td>26</td>
<td>49</td>
<td>548</td>
</tr>
<tr>
<td>Student lessons</td>
<td>1</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>+ e-learning</td>
<td>2</td>
<td>5</td>
<td>39</td>
</tr>
<tr>
<td>Student lessons + training</td>
<td>1</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>E-learning + training</td>
<td>4</td>
<td>9</td>
<td>96</td>
</tr>
<tr>
<td>E-learning + monitor report</td>
<td>12</td>
<td>22</td>
<td>233</td>
</tr>
<tr>
<td>Training + monitor report</td>
<td>6</td>
<td>11</td>
<td>126</td>
</tr>
<tr>
<td>Three components implemented</td>
<td>21</td>
<td>39</td>
<td>439</td>
</tr>
<tr>
<td>Student lessons + e-learning + training</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Student lessons + e-learning + monitor report</td>
<td>5</td>
<td>9</td>
<td>115</td>
</tr>
<tr>
<td>Student lessons + training + monitor report</td>
<td>2</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>E-learning + training + monitor report</td>
<td>13</td>
<td>25</td>
<td>296</td>
</tr>
<tr>
<td>Four components implementedb</td>
<td>10</td>
<td>21</td>
<td>222</td>
</tr>
</tbody>
</table>

*The “zero component implemented” category excludes 1,280 control-group students in 73 classes and 139 teachers. bLessons + teacher e-learning + teacher training + monitor report.
Effects of Stacking Universal Program Components

The degree of implementation varied in both experimental conditions. Dividing schools into subgroups of different implementation levels (i.e., implementation of zero, one, two, three, or four universal components) showed that proportion scores for peer-reported victimization and reinforcing behavior significantly decreased when multiple components were delivered (see Table 7).

Compared to classes where zero components had been implemented (including control schools), the proportion of peer-reported victims showed a significant decline in classes where all components were executed, $b = -0.049, SE = 0.015, p = 0.001, 95\% CI [-0.08, -0.02], Cohen’s $d = .07$. We found similar results for the number of hours that teachers invested in the PRIMA program. The more hours teachers devoted to the program, a decline in mean proportion scores of peer-reported victims was observed in classes, $b = -0.005, SE = 0.001, p = 0.001, 95\% CI [-0.01, -0.00]. In contrast to the stacking analysis, a significant decrease in proportion scores for peer-reported bullies was also revealed for every hour that teachers invested in PRIMA, $b = -0.009, SE = 0.004, p = 0.041, 95\% CI [-0.02, -0.00]. No significant relations were found between program stacking or dosage and self-reported victimization and bullying.

Furthermore, we found positive effects for stacking program components on the mean proportion scores for peer-reported reinforcers. Students in classes where two or three program component were implemented showed significant decreases in mean scores for peer-reported reinforcers compared to students in classes where no components were implemented, $b = -0.06, SE = 0.03, p = 0.040, 95\% CI [-0.11, -0.00], d = -0.11; b = -0.07, SE = 0.03, p = 0.032, 95\% CI [-0.13, -0.01], d = -0.18$, respectively. The implementation of four components did not further enhance this effect. Also, for the number of hours that teachers invested in the PRIMA program, a decline in mean proportion scores of peer-reported victims was observed in classes, $b = -0.009, SE = 0.004, p = 0.001, 95\% CI [-0.01, -0.00]. We found no statistically significant relation between stacking components or the number of hours of program delivery and the number of peer-reported outsiders and defenders. Also, no significant interaction effects were found on gender, age, or ethnicity.

Discussion

This study provides experimental evidence for the assumed relation between antibullying program components and bullying behavior using a design with two experimental groups and a control group. The results of our study indicate that it is specifically the PRIMA-$L^+$ program, including both student and teacher components, which is effective in reducing peer-reported bullying in Grades 3–6 in elementary school. Since bullying emerges in elementary education, this study provides positive

### Table 5

<table>
<thead>
<tr>
<th>Roles in Bullying Situations by Condition (Received Intervention Analysis)</th>
<th>PRIMA-$L^-$</th>
<th>PRIMA-$L^+$</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>CS</td>
</tr>
<tr>
<td>Victims</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report</td>
<td>0.625 (1.199)</td>
<td>0.450 (1.022)</td>
<td>-0.175</td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.054 (0.087)</td>
<td>0.039 (0.082)</td>
<td>-0.015</td>
</tr>
<tr>
<td>Bullies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report</td>
<td>2.061 (3.003)</td>
<td>2.226 (3.070)</td>
<td>0.165</td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.064 (0.103)</td>
<td>0.069 (0.138)</td>
<td>0.005</td>
</tr>
<tr>
<td>Reinforcers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.062 (0.083)</td>
<td>0.064 (0.101)</td>
<td>0.002</td>
</tr>
<tr>
<td>Outsiders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.074 (0.064)</td>
<td>0.126 (0.133)</td>
<td>0.052</td>
</tr>
<tr>
<td>Defenders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer-report</td>
<td>0.198 (0.119)</td>
<td>0.291 (0.202)</td>
<td>0.093</td>
</tr>
</tbody>
</table>

Note: Victims self-report $N = 2,316$; bullies self-report $N = 2,072$, peer-report $N = 2,309$. CS = change score (computed as T2-T1)
Table 6
Estimates for Received-Intervention Effects of PRIMA on Students’ Roles in Bullying Situations

<table>
<thead>
<tr>
<th>Roles</th>
<th>Victims</th>
<th>Bullies</th>
<th>Reinforcers</th>
<th>Outsiders</th>
<th>Defenders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
<td>SE</td>
<td>Estimate</td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.987***</td>
<td>.193</td>
<td>.168</td>
<td>.636</td>
<td>.019</td>
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<tr>
<td>Fixed effects</td>
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</tr>
<tr>
<td>PRIMA-L+</td>
<td>.031</td>
<td>.072</td>
<td>.026</td>
<td>.252</td>
<td>.033</td>
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<td>PRIMA-L−</td>
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<td>.075</td>
<td>.011</td>
<td>.258</td>
<td>.033</td>
</tr>
<tr>
<td>Pretest score</td>
<td>.379***</td>
<td>.017</td>
<td>.852***</td>
<td>.020</td>
<td>.935***</td>
</tr>
<tr>
<td>Boy</td>
<td>.004</td>
<td>.036</td>
<td>.003</td>
<td>.112</td>
<td>.011*</td>
</tr>
<tr>
<td>Age</td>
<td>.067</td>
<td>.018</td>
<td>.002</td>
<td>.099</td>
<td>.002</td>
</tr>
<tr>
<td>Nonwestern</td>
<td>.002</td>
<td>.051</td>
<td>.003</td>
<td>.591</td>
<td>.017**</td>
</tr>
<tr>
<td>Large schools</td>
<td>.082</td>
<td>.061</td>
<td>.009</td>
<td>.213</td>
<td>.005</td>
</tr>
<tr>
<td>Urban area</td>
<td>.042</td>
<td>.061</td>
<td>.009</td>
<td>.211</td>
<td>.021</td>
</tr>
<tr>
<td>Special needs students</td>
<td>.039</td>
<td>.061</td>
<td>.009</td>
<td>.213</td>
<td>.005</td>
</tr>
<tr>
<td>Random effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group level</td>
<td>.017</td>
<td>.008</td>
<td>.001</td>
<td>.003</td>
<td>.004</td>
</tr>
<tr>
<td>School level</td>
<td>.010</td>
<td>.008</td>
<td>.000</td>
<td>.003</td>
<td>.000</td>
</tr>
<tr>
<td>ΔAIC</td>
<td>-799.62***</td>
<td>1,091.82***</td>
<td>-2,253.07***</td>
<td>1,404.73***</td>
<td>1,147.87***</td>
</tr>
</tbody>
</table>

Note. Self-report N = 2,316; bullies self-report N = 2,072, peer-report N = 2,309. AIC = Akaike information criteria.
*p < .05. **p < .01. ***p < .001.
indications that children in this age range are susceptible to antibullying programs’ positive effects.

We found evidence for the effectiveness of PRIMA-L⁺ to reduce the number of peer-reported victims and reinforcers. However, we did not find any significant declines in bullying and victimization for PRIMA-L−, indicating that the student lessons are a crucial component. We did not find any differences either in self-reported victims and bullies between PRIMA- and control schools. The reduction in self-reported victims was the highest in the PRIMA-L⁺ condition but did not reach statistical significance. Therefore, our first hypothesis that schools with PRIMA more effectively reduce bullying and victimization than control schools is partially supported by our findings.

Furthermore, we found stronger effects when teachers implemented multiple program components in their classes. Classrooms where all four universal components were implemented showed the only statistically significant reduction in the number of peer-reported victims. This finding highlights that the full implementation of the multi-component antibullying program is crucial in achieving optimal results. Again, we did not find similarly positive results for self-reported victimization and bullying, and therefore, our study has found positive but partial evidence for our hypothesis that the implementation of more program components is related to stronger program effects.

Our results highlight the importance of supporting both students and teachers to decrease bullying in schools. This finding is in line with the correlational outcomes of Ttofi and Farrington’s (2011) meta-analysis. Our findings also underline the importance of a school-wide approach in antibullying programs, indicating that bullying is a complex phenomenon that needs to be addressed at multiple levels in the school (Hong & Espelage, 2012), including individual students, the classroom, the teacher, and school.

We found different results for self- and peer-reported bullying behavior. Self-reports are considered to reflect students’ subjective perceptions of being bullied, whereas peer-reports are considered to reflect observed bullying behavior and students’ reputations in the class (Karnä et al., 2011). Several studies have reported a modest agreement between the two perspectives (Branson & Cornell, 2009; Demaray et al., 2013). Self-reports are considered the standard to measure bullying and victimization, whereas peer-reports are considered to be sensitive to reputation-bias (Olweus, 1993). However, as peers are often present at most bullying incidents (Salmivalli, 2014), peer-reports reflect multiple

### Table 7

<table>
<thead>
<tr>
<th></th>
<th>Victims</th>
<th>Bullies</th>
<th>Reinforcers</th>
<th>Outsiders</th>
<th>Defenders</th>
</tr>
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<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Intercept</td>
<td>1.008*** 0.024</td>
<td>0.064 0.021</td>
<td>0.027</td>
<td>0.133**</td>
<td>0.136</td>
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<tr>
<td>Fixed effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1 component (vs. 0)</td>
<td>−0.014 −0.011</td>
<td>−0.336 −0.050</td>
<td>−0.048</td>
<td>−0.048</td>
<td>−0.152</td>
</tr>
<tr>
<td>2 components (vs. 0)</td>
<td>0.007 0.018</td>
<td>0.053 −0.051</td>
<td>−0.058*</td>
<td>−0.027</td>
<td>−0.139</td>
</tr>
<tr>
<td>3 components (vs. 0)</td>
<td>−0.046 −0.021</td>
<td>−0.202 −0.049</td>
<td>−0.068*</td>
<td>−0.025</td>
<td>−0.147</td>
</tr>
<tr>
<td>4 components (vs. 0)</td>
<td>−0.084 −0.049**</td>
<td>−0.334 −0.065</td>
<td>−0.055</td>
<td>0.019</td>
<td>−0.151</td>
</tr>
<tr>
<td>Pretest score</td>
<td>0.374*** 0.848****</td>
<td>0.539*** 0.937***</td>
<td>0.868***</td>
<td>0.333***</td>
<td>0.760***</td>
</tr>
<tr>
<td>Boy</td>
<td>0.014 −0.005</td>
<td>0.598*** 0.016***</td>
<td>0.025***</td>
<td>−0.026***</td>
<td>−0.041***</td>
</tr>
<tr>
<td>Age</td>
<td>−0.068*** −0.000</td>
<td>0.083 0.000</td>
<td>0.001</td>
<td>−0.006*</td>
<td>0.004</td>
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<tr>
<td>Nonwestern</td>
<td>−0.009 −0.004</td>
<td>0.069 0.017**</td>
<td>0.014</td>
<td>−0.003</td>
<td>−0.005</td>
</tr>
<tr>
<td>Large schools</td>
<td>−0.092 −0.011</td>
<td>−0.155 −0.034</td>
<td>−0.043</td>
<td>−0.012</td>
<td>−0.023</td>
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<tr>
<td>Urban area</td>
<td>−0.037 0.015</td>
<td>0.184 0.043</td>
<td>0.034</td>
<td>0.083*</td>
<td>0.210</td>
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<td>Special needs students</td>
<td>−0.045 0.004</td>
<td>−0.109 0.037</td>
<td>0.030</td>
<td>0.002</td>
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<tr>
<td>Random effects</td>
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<td></td>
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<tr>
<td>Group level</td>
<td>0.016 0.001</td>
<td>0.239 0.010</td>
<td>0.010</td>
<td>0.032</td>
<td>0.324</td>
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<tr>
<td>School level</td>
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<td>0.116 0.004</td>
<td>0.003</td>
<td>0.001</td>
<td>0.044</td>
</tr>
<tr>
<td>ΔAIC</td>
<td>−1,000.46*** 1,240.49***</td>
<td>−2,692.83*** 1,369.73***</td>
<td>1,118.05***</td>
<td>−83.98*</td>
<td>658.64***</td>
</tr>
</tbody>
</table>

Note. Victims self-report N = 2,774; bullies self-report N = 2,473, peer-report N = 2,767. AIC = Akaike information criteria. *p < .05. **p < .01. ***p < .001.
students’ observations on the behaviors of each classmate. Therefore, such multiple-informant peer-reports of bullying and victimization are viewed as valid and reliable (Branson & Cornell, 2009; Ladd & Kochenderfer-Ladd, 2002). Besides, peer-reports are less influenced by bullies and victims’ possible reluctance to report bullying (Branson & Cornell, 2009; Cornell, Sheras, & Cole, 2006). Seen from this perspective, peer- and self-reported bullying behavior are the proverbial two sides of the same coin. Few experimental studies have investigated effects on both self- and peer-reported bullying and victimization. The findings from our study on peer-reports are in line with the findings of Kärnä et al. (2011), where also stronger effects of the KiVa intervention were found for peer-reported victimization compared to self-reports.

Unlike previous research that showed effects on self-reported victimization (Gaffney et al., 2019; Kärnä et al., 2011), our findings show that the number of self-reported victims declined in all conditions. A possible explanation for this result is a decrease in self-perceived victimization because of the recent implementation of antibullying guidelines for all schools in the Netherlands, assuming that this policy has affected children’s subjective perceptions. Another possible explanation is that peers in the classroom may be the first to observe a change in bullying behavior or reputations, whereas PRIMA may only result in delayed effects for victims’ subjective experience. Possibly, bullying behavior has to stop before victims’ experience improvement from their point of view. More experimental research into the different perspectives on self- and peer reports of victims is needed to study this matter.

We also explored the effects of PRIMA on other roles in bullying situations. Our results indicated a significant decrease in the mean proportion scores of reinforcers in PRIMA-L schools compared to control schools. A notable finding was that even though the student lessons explicitly target all students to respond when bullying occurs, we did not find an increase in the number of defenders in the PRIMA-L schools. This finding is not in line with the meta-analytical review of Polanin, Espelage, and Pigott (2012), who reported small to medium effect sizes for bullying prevention programs on defending behavior. A possible explanation for our deviant finding is that the number of peer-reported defenders was already relatively high at the pretest in all three conditions (i.e., proportion scores ranging from .19 to .21), which left little room for further improvement. Another possible explanation is that the proportion scores for the defender’s role remained stable from pretest to posttest in all schools, whereas the number of victims declined in the intervention schools. However, the group process of bullying is complex, as previous research showed that victims and bullies are defended by their in-group members, suggesting that the defender role can be controversial for students (Huitsing & Veenstra, 2012). In this study, we also found some combinations of negative roles (i.e., high proportion scores for bully victims, reinforcer-victims, defender-bullies), indicating that individual students' roles can be controversial (see also, Ladd et al., 2017). Investigating which students defend which classmates and whether these roles change as a result of the intervention requires further investigation in future experimental research.

An unexpected finding concerned the differential effects and levels of implementation of PRIMA-L+ schools versus PRIMA-L schools. Our results show that teachers in PRIMA-L+ schools implemented the program components more intensively than teachers in PRIMA-L schools. A possible explanation for this finding is that delivering the student lessons in the PRIMA-L+ condition had a stimulating effect on teachers, which subsequently supported the other components’ implementation. Sainio et al. (2020) found similar results for the KiVa student curriculum. This finding suggests that a universal curriculum component with traditional lessons for the regular class may lay the foundation for teachers and students for optimal implementation of school-wide antibullying programs with various other components.

**Strengths and Limitations**

Our study’s strength is that we conducted a cluster randomized controlled trial design, which enhances the internal validity of our experimental study (Farrington & Welsh, 2005). Furthermore, we conducted an a priori randomization to prevent the self-selection of schools. We then included schools with similar motivation levels in all conditions as a representative educational setting, supporting both the internal and external validity of our experimental findings (Astor, Guerra, & van Acker, 2010). Another strength of this study is that we used multiple informants to examine victimization and bullying. Because of the complexity of bullying, several scholars addressed the desirability to assess bullying using multiple informants (Branson & Cornell, 2009; Griffin & Gross, 2004). Using both self- and peer-reports enabled us to examine two distinct
constructs: self-perceptions, relating to subjective individual experiences, and peer-perceptions, characterizing social representations in a group. In line with previous studies (Branson & Cornell, 2009; Cole, Cornell, & Sheras, 2006), our results showed that self-reporting scores are lower than peer-reports. Victims in elementary school may be reluctant to report bullying in fear of the bully’s reprisals or because they are concerned that their reports are dismissed by their teacher (Fekkes et al., 2005; Newman & Murray, 2005). Students who bully others may be reluctant to report the bullying behavior in fear of social disapproval of their peers (Branson & Cornell, 2009).

A limitation of this study is that both experimental groups implemented the program with varying levels, which complicated the evaluation of the student lessons’ specific contribution. Due to a low variation related to program implementation in the PRIMA-L group, we could not control statistically for the difference in the degree of program implementation in our models. Teachers and school management may not have had enough time to implement all components in addition to their existing curriculum and low motivation of staff to implement a school-wide program (Orobio de Castro et al., 2018). Future experimental research should measure factors that may influence the degree and quality of program implementation, such as perceptions on leadership and program effectiveness (Domitrovich et al., 2008; Durlak & DuPre, 2008; Orobio de Castro et al., 2018; Veenstra et al., 2014).

Furthermore, this study’s scope was restricted to outcomes measured in Grades 3–6, whereas the PRIMA program targeted all school students. Assessing bullying among younger children requires different, developmentally appropriate methods, such as using pictures of all children in the class to nominate classmates or observations and recordings of bullying situations (Alsaker & Nägele, 2008). We strongly recommend including such methods in future experimental research to investigate school-wide anti-bullying programs’ effectiveness across all grades since several studies show that bullying starts early in primary education.

Finally, the findings of this study should be understood within the Dutch cultural context. Since 2015, new guidelines were initiated by the Ministry of Education, which may have motivated both intervention and control schools to evaluate their policies and to implement a new program.

**Practical Implications**

Our results indicate that a school-wide antibullying program with multiple components, strengthening both students and teachers, effectively reduces peer-reported victimization. An important practical implication is that schools could benefit from evidence-based antibullying programs, and more attention is needed to increase awareness among school management and teachers to select and implement these programs adequately. Implementing a school-wide program requires support and time from all professionals in the school (Durlak & DuPre, 2008; Gaffney et al., 2019; Orobio de Castro et al., 2018), and school management and teachers need to be facilitated in resources and time to implement a school-wide program appropriately.

More attention is needed in experimental research and educational practice for self- and peer-reported victimized students who remain victimized despite the implementation of an antibullying program. There is a growing body of literature indicating that not all students benefit from a universal school-wide antibullying program (Huitsing, Lodder, Oldenburg, et al., 2020; Kaufman, Kretschmer, Huitsing, & Veenstra, 2018) and that victimized students may experience high feelings of distress (Garandeau & Salmivalli, 2019; Huitsing, Lodder, Oldenburg, et al., 2020). These findings indicate the need for more research and future development of programs for this group of vulnerable students.

**References**


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Sainio, M., Herkama, S., Turunen, T., Rönkkö, M., Kontio, M., Poskiparta, E., & Salmivalli, C. (2020). Sustainable antibullying program implementation: School profiles...