



Teachers as Informant for Students' Bullying Involvement: The Impact of Teacher Training on Agreement between Teacher vs. Self- and Peer Reports

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Abstract

Accurate identification of students' involvement in bullying is crucial for effective bullying prevention program implementation. Self- and peer reports are commonly used towards this end despite ethical and methodological challenges. Teacher reports offer a promising alternative, but teachers' limited awareness of and/or views towards bullying may affect their reporting accuracy. The present study investigated teachers' reporting accuracy for students' bullying involvement and whether this accuracy improved through training. We compared teacher reports of bullying involvement with their self- and peer report equivalents at two time points in a large Dutch primary school sample ($N=3,255$; 167 classrooms). A subsample ($n=1,855$) participated in teacher training components of the PRIMA bullying prevention program (i.e., e-learning, face-to-face training, and diagnostic monitoring). Observed agreement between teachers vs. self- and peer reports were moderate to high, especially for bully and victim roles. Agreement also improved over time for teacher vs. peer reports. In fact, all teacher training components improved peer-teacher agreement on victim identification. Face-to-face training and diagnostic monitoring showed promising trends for bystander role identification, while e-learning yielded mixed results. Taken together, these findings indicate that teachers can be reliable informants for bullying and victimization, especially when supported by targeted training and monitoring, which may also help them to identify bullying behavior earlier and intervene more promptly.

Keywords Teacher reports · Bullying roles · Informant agreement · Teacher training · Self-reports · Peer-reports

Bullying is defined as the recurrent and goal-directed power exploitation by one or more aggressors (i.e., bully or bullies) aimed at inflicting harm to a specific target (i.e., the victim; Salmivalli, 2010; Volk et al., 2014). Bullying unfolds within

a dynamic social context in which witnessing bystanders can support the continuance of the bullying (i.e., reinforcers), support the victim and/or try to stop the bullying (i.e., defenders), and try to refrain from involvement in the situation (i.e., outsiders; Chen et al. 2020b; Olthof et al. 2025; Salmivalli et al. 1996). Within schools, bullying is the most prevalent subtype of aggression encountered by students (e.g., Hawker & Boulton, 2000). Bullying poses a pervasive challenge that can not only impact students' mental health, academic performance, and well-being, but can also create a disruptive atmosphere that hinders learning and development (e.g., Hawker & Boulton, 2000; Nishina & Juvonen, 2005; Troop-Gordon et al., 2014). Central to effectively addressing and reducing the impact of bullying is the accurate identification of the different ways in which students can be involved in bullying (e.g., Polanin et al., 2012). Correct identification of students' involvement in bullying can facilitate the implementation of tailored interventions that

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provide students the necessary support to counter bullying and foster a safer classroom and educational environment (Pronk et al., 2024; Salmivalli, 2010). The present study investigated teachers' potential as reporters for students' involvement in bullying and whether teacher training components may improve their reporting accuracy.

A variety of information sources exist to identify students' involvement in bullying. These include self-reports, peer reports or nominations, natural observations and teacher reports or assessments (e.g., Atlas & Pepler, 1998; Pellegrini & Long, 2002; Olweus, 1996; Salmivalli et al., 1996). All of these information sources have their own advantages and disadvantages. First, self-reports provide students' individual perspective and perception but can therefore also result into under- or overreporting of students' actual behavioral involvement in bullying (e.g., Gromann et al., 2013, for example, because of social desirability. Second, peer reports or nominations provide a more objective and multi-informant perspective of students' involvement in bullying from familiar peers who are often present during bullying situations (e.g., Kärnä et al., 2011). However, as such, peer reports also constitute reputational measures of bullying involvement and may therefore not (always) align with students' own perception (e.g., Juvonen et al., 2001). Third, natural observations offer unparalleled and direct insights into actual peer and bullying interactions but are less feasible for widespread use as they are costly and time-intensive (e.g., Atlas & Pepler, 1998; Craig et al. 2000a). Finally, teacher reports or assessments could be a vital information source for students' involvement in bullying (e.g., Pronk et al., 2024; van Verseveld et al., 2019; Veenstra et al., 2014). Teacher reports combine the pros of natural observation without its cons. However, from observational studies we know that most bullying unfolds outside of teachers' awareness and presence (Atlas & Pepler, 1998; Craig et al. 2000a). Moreover, teachers may not perceive all bullying as actual bullying or as harmful behavior (e.g., Bauman & Del Rio, 2006; Bradshaw et al. 2007; Craig et al. 2000b; Dawes et al. 2024). As a result, it is currently unclear whether teachers are, and/or can be, indeed, an accurate information source for students' bullying involvement. However, recent qualitative data suggests that teachers improve their ability to diagnose classroom bullying dynamics through teacher training (Pronk et al., 2024).

The main aim of this present study is to gain more—quantitative—insight into the potential of teachers as an information source for students' bullying involvement. First, we investigated teachers' general accuracy as an information source for students' involvement in bullying. In this study, we operationalize “accuracy” as the level of agreement between teacher reports and student self- and peer reports, rather than accuracy relative to an external gold-standard

criterion. Because bullying involvement is inherently difficult to verify through fully objective measures, we consider convergence across informants (i.e., self and peers) as a proxy for reporting accuracy. Specifically, we investigated the agreement between teacher reports vs. self- and peer reports of bullying involvement cross-sectionally and longitudinally. Self- and peer-reports served as reference sources because they capture complementary aspects of students' involvement in bullying (e.g., Gromann et al., 2013; Kärnä et al., 2011). Self-reports provide access to internal states and covert behaviors that may be invisible to external observers. Peer reports, on the other hand, reflect group reputation and social dynamics. This makes peer reports especially informative for identifying bystander roles such as reinforcers, assistants, and outsiders, which can be more subtle and may escape teacher notice. Together, self- and peer reports provide the most widely accepted and commonly used reference sources in bullying research. By collecting measurements at the beginning and end of the school year we were also able to investigate the improvement of teachers' reporting accuracy over the course of a school year, regardless of targeted teacher training. That is, teachers' reporting accuracy may improve over the course of the school year simply because they become more familiar with their students and the classroom dynamics.

Beyond describing teachers' baseline reporting accuracy, it is essential to determine whether such accuracy can be enhanced through professional development. Therefore, our second aim was to investigate whether teacher training improves their reporting accuracy. Specifically, we investigated the influence of teacher training components of a bullying prevention program on teacher accuracy by comparing the data of teachers who participated in this program and those who did not (control condition) with their self- and peer report equivalents. The bullying prevention program in question is the Dutch PRIMA program (van Verseveld et al., 2021). PRIMA is the Dutch extended adaptation of the Olweus Bullying Prevention Program (Olweus & Limber, 2010). It is a modular program aimed at educating students and teachers about bullying while equipping them with strategies to identify and address it (van Verseveld et al., 2021). This is achieved by implementing four program modules: (1) a student curriculum, (2) an e-learning for teachers, (3) a face-to-face teacher training, and (4) a digital monitor for diagnosing classroom bullying dynamics. A full description of the PRIMA program is provided by van Verseveld and colleagues. The PRIMA program may thus support teachers to more accurately and reliably identify their students' involvement in bullying by fostering their awareness and understanding of bullying roles. That is, through PRIMA, the consensus of teacher reports with students' own perception and their peer reputation could

be improved. Because PRIMA is a modular program, we could investigate the influence of each separate program module on improving teachers' accuracy in identifying their students' involvement in bullying compared with self- and peer reports by students.

In short, the present study investigated the accuracy and potential of teachers as an information source for students' involvement in bullying. We investigated teachers' reporting accuracy as compared with self- and peer reports both concurrently and longitudinally. In the longitudinal analyses, we also investigated the effects of teacher training on their reporting accuracy. If teacher training can improve the teachers' accuracy and reliability as information sources for students' involvement in bullying, teachers can facilitate the implementation of tailored interventions to counteract classroom bullying (cf. Pronk et al., 2024). Moreover, teachers could then become a (cost-)efficient information source for students' bullying involvement, circumventing ethical concerns that may arise when asking youth about their own or their peers' involvement through self- or peer reports (e.g., psychological harm, informed consent complexity, and other risks).

Methods

Participants

We used data from a longitudinal intervention study investigating the implementation and effectiveness of the PRIMA program (van Verseveld et al., 2021). A total of 3255 students were included from 33 different primary schools and 167 different classrooms ($M_{\text{classroom-}N} = 20$). A subsample of 1855 students participated in the intervention condition from classrooms in which teachers followed all teacher-related program components (i.e., teacher e-learning, face-to-face teacher training, teacher diagnostic monitor reporting). A subset of students in the intervention condition subsample also followed a student curriculum themselves ($n=873$ or 47.1%). Sample demographic information is reported in

Table 1 Description of the sample in the intervention and control group ($N=3244$)

		Control $N=1389$	Intervention $N=1855$
Age	$M (SD)$	9.96 (1.21)	10.01 (1.20)
Boy	$n (%)$	656 (47.2)	874 (47.1)
Dutch	$n (%)$	1114 (80.2)	1358 (73.2)
Monitoring report	$n (%)$	n.a.	1046 (56.4)
Training session	$n (%)$	n.a.	870 (46.9)
E-learning	$n (%)$	n.a.	791 (42.6)

Note: Differences between the intervention and control group were tested with a Chi-square test and not significantly different ($p > .05$). n.a. means not applicable

Table 1. Ethical Review approval was granted by the Faculty of Social and Behavioral Sciences' ethical board at the University of Amsterdam (nr. 2016-CDE-8008). The trial was registered in the ISRCTN register (file number 15425978).

Procedure

Data collection took place at participating schools and started at the beginning of the school year in September 2017. The data were gathered during two waves: a pretest in October–November 2017 and a posttest in March–April 2018. During each wave, students completed two online questionnaires during school hours, with two researchers present to instruct students, ensure their privacy, and explain the confidentiality of their responses. Teachers filled out a questionnaire at the same time.

Following the pretest, schools received access to the materials of the PRIMA program with the following implementation strategy: (1) training for teachers and principals: In November/December 2017, teachers and principals consulted the monitor report and participated in e-learning and face-to-face training sessions; (2) student curriculum delivery: In December 2017/January 2018, schools in the intervention group with additional student lessons delivered the student curriculum directly to students; and (3) protocol implementation: Schools implemented protocols for students at risk of being involved in bullying or in specific bullying situations as required. Students in schools with additional lessons received direct exposure to the program through the student curriculum, whereas students in the other intervention condition were indirectly exposed via teacher-focused components. Control schools adhered to nationally established antibullying guidelines, such as monitoring student wellbeing, having an antibullying coordinator, and maintaining a social safety policy. Control schools were interviewed by telephone at the beginning and end of the data collection period to ensure they were not running any school-wide anti-bullying programs during the trial period, which none of the 13 control schools did.

Measurements

Self-Report for Bullying Involvement

The Revised Olweus Bully/Victim Questionnaire (OBVQ; Olweus, 1996) is a standardized self-report measure assessing bullying behavior and victimization among school-aged children over the past few months. The OBVQ includes sections on bullying victimization (frequency, nature, and context of being bullied) and bullying perpetration (frequency and type of engaging in bullying), covering various forms of bullying such as physical, verbal, relational,

and cyberbullying. Items are rated on a Likert scale to measure frequency, and contextual data is gathered to explore peer, teacher, and bystander involvement. For this study, a revised OBVQ global item measured victimization (“How often have you been bullied at school in the last couple of months?”) with responses dichotomized to distinguish low-frequency (0 = not at all/once or twice) and higher-frequency (1 = two or more times per month) experiences. Similar criteria were used to assess self-reported bullying behaviors across eight items with strong internal consistency ($\alpha=0.88$). These multiple-item scales aim to minimize underreporting and capture nuanced behaviors, offering validated and reliable data to evaluate intervention effectiveness and bullying dynamics.

Peer Report for Bullying Involvement

The Participant Roles Scales (PRS; Salmivalli et al., 1996) is a self-report instrument designed to assess students’ involvement in bullying situations through the roles of bully, victim, assistant (not differentiated from bully in the present study), reinforcer, defender, and outsider. The PRS has been validated across diverse settings, demonstrating strong reliability and utility in capturing the collaborative nature of bullying, including bystander actions and intervention behaviors. It is widely used to understand group-level processes in bullying and inform targeted prevention strategies. For each specific role, students were asked to nominate classmates. The following questions were asked to gauge each role: “Which children are being bullied by other children?”; “Which classmates bully other children?”; “Which classmates reinforce bullying behavior, for example, by laughing or giggling when someone gets bullied?”; “Which classmates do nothing when someone gets bullied, for example, they walk away or act like they did not see the bullying?”; “Which classmates help children that are being bullied, for example, by comforting, supporting, or defending them?”. Students could nominate an unlimited number of classmates or none at all. To prevent systematic nomination bias, the order of student names was randomized. Peer nominations were totaled and when the number of students in the class was less than twenty, at least two nominations were required to assign the role, when the number of students in the class was twenty or more then 3 or more nominations would assign the role. These cut-off points reduced false-positive role assignment from single nominations, while maintaining a comparable minimum endorsement rate across class sizes. Because role assignment is inherently discrete and occurs within classrooms, we prioritized fixed minimum counts rather than proportional thresholds to avoid assigning roles on the basis of extremely small denominators in small classes. Students could be assigned

to multiple roles if they met the role criteria for more than one role (e.g., bullying and reinforcer).

Teacher Report for Bullying Involvement

Teacher nominations were also assessed with a teacher-adapted version of the PRS (Salmivalli et al., 1996). Teachers could nominate students in their classroom for each bullying role, guided by similar questions as in the peer report. They were allowed to assign multiple roles to each student, mirroring the peer-report framework. When there was more than one teacher involved with a classroom, the nominations were averaged, and the role was assigned when the average score was larger than or equal to 0.50. This majority-endorsement rule leverages convergent evidence across adult observers and preserves a consistent decision threshold across classrooms with different numbers of teachers. Under this rule, $M \geq 0.50$ corresponds to endorsement by at least half of the teachers (e.g., ≥ 1 of 2; ≥ 2 of 3).

Intervention Module Adherence

In this study, the PRIMA intervention was implemented through teacher training components. Several measures were assessed to evaluate teacher’s adherence to the teacher training components. First, teachers had access to a monitor report, which summarized the results of a bullying questionnaire completed by students in the classroom. This report provided teachers with insights into the bullying processes and structures reported by the students. Consultation of the monitor report was measured as an indicator of whether teachers reviewed all its components. Second, training attendance was assessed for the face-to-face training provided to teachers. Similarly, e-learning participation was measured to determine whether teachers had completed all parts of the e-learning modules.

Statistical Analysis

First, we assessed rater agreement in two ways: (1) observed agreement, or the overall proportion of cases where two raters provided the same rating, regardless of whether this rating was positive or negative (e.g., agreement on being a victim or not being a victim); and (2) positive agreement, or the proportion of cases where both raters agreed on the positive rating (e.g., agreement on the victim role). We computed these proportions for each rater pair (self vs. teacher and peer vs. teacher) and reported them at each assessment point (pretest and posttest) with corresponding confidence intervals (de Vet et al., 2018).

Subsequently, a generalized linear mixed model was used to examine the increase in agreement over time and

the interaction between time and intervention effects, i.e. teacher training adherence. A random effect at the subject level was included to account for individual variability. The following model was estimated:

$$\text{logit}(P(Y_{ij} = 1)) = \beta_0 + \beta_1 X_{ij} + \mu_i$$

where $\text{logit}(P(Y_{ij} = 1))$ is the log-odds of the probability of outcome Y_{ij} being 1 (i.e., full agreement between raters) for subject i at time point j . β_0 represents the intercept and $\beta_1 X_{ij}$ the fixed effect estimate. The random intercept for subject i is defined as μ_i , and is assumed to follow a normal distribution with $M=0$ and σ_u^2 : $u_i \sim \mathcal{N}(0, \sigma_u^2)$.

The multilevel model was estimated for the observed agreement and positive agreement on each reported role (i.e., bully, victim, outsider, reinforcer, and defender). For each rater-pair (i.e., self-teacher and peer-teacher), the change in agreement over time was examined in model 1 with time as fixed effect. The effect of the intervention (adherence) over time on the agreement between raters was assessed with the interaction between time and intervention (type of adherence) for the agreement between raters (model 2) in the intervention condition.

Model 1:

$$\text{logit}(P(Y_{ij} = 1)) = \beta_0 + \beta_1 \text{time}_{ij} + \mu_i$$

Model 2:

$$\text{logit}(P(Y_{ij} = 1)) = \beta_0 + \beta_1 \text{time}_{ij} + \beta_2 \text{interventionadherence}_{ij} + \beta_3 \text{time} * \text{interventionadherence}_{ij} + \mu_i$$

With model 2 we evaluate the effect of several intervention adherence measures on the agreement between raters: consultation of the monitor report, face-to-face training attendance, and e-learning participation.

Results

Role Assignments

As preliminary analyses, we investigated the proportion of students assigned to each role by different raters per assessment. The results are displayed in Fig. 1, distinguishing between students in control schools and PRIMA schools. The data revealed several trends over time. For the role of victim, both peer and self-ratings indicated a decrease in the number of victims over time in both PRIMA and control schools, while teacher ratings remained relatively stable. For engagement in bullying behavior, self-reports showed an increase over time in PRIMA schools. Regarding the defender role, peers consistently rated a relatively high

number of students as defenders, with a slight increase over time also noted in teacher ratings. For reinforcers, peer ratings showed a decrease over time, whereas teacher ratings indicated a slight increase. Finally, in the outsider category, peer ratings showed an increase in the number of outsiders over time in PRIMA schools and a decrease in control schools. Teacher ratings for outsiders remained stable in control schools but showed a decrease in PRIMA schools.

Rater Agreement

The results presented in Table 2 highlight distinct patterns of agreement between teacher vs. self- and peer report across bullying roles (over time) regardless of intervention condition. For the victim role, agreement between teacher ratings and both peer and self-reports was similar. However, the positive agreement was stronger for peer-teacher ratings than for self-teacher ratings. Longitudinally, observed agreement increased, with a significant increase in positive agreement specifically for peer-teacher ratings. For the bully role, peer-teacher agreement was considerably higher than self-teacher agreement. For the defender, reinforcer, and outsider roles, agreement between raters showed a slight increase over time.

Rater Agreement in Intervention Schools

The change in teacher reporting accuracy during the study in the intervention (i.e., PRIMA) schools compared to control schools was assessed using multilevel modeling and revealed varied effects across bullying roles as can be seen from Table 3. The odds ratios (ORs) indicate the relative change in agreement over time in PRIMA schools compared with control schools. Non-significant effects are included for transparency. For the victim, bully and reinforcer roles, the changes in agreement over time were not stronger in intervention schools than in control schools. In contrast, agreement for the defender role and the outsider role improved significantly more in intervention schools. For the defender role, OR = 1.33 (95% CI[1.05, 1.68]) indicates that the increase in the odds of teacher–peer agreement from T0 to T1 was 33% larger in PRIMA schools than in control schools. For the outsider role, OR = 1.50 (95% CI[1.20, 1.87]) indicates a 50% larger increase in the odds of teacher–peer agreement over time in PRIMA versus control schools.

Monitor Report Consultation

Table 4 shows the influence of PRIMA diagnostic monitor report consultation on teacher reporting accuracy across bullying roles for teachers in the intervention condition. The

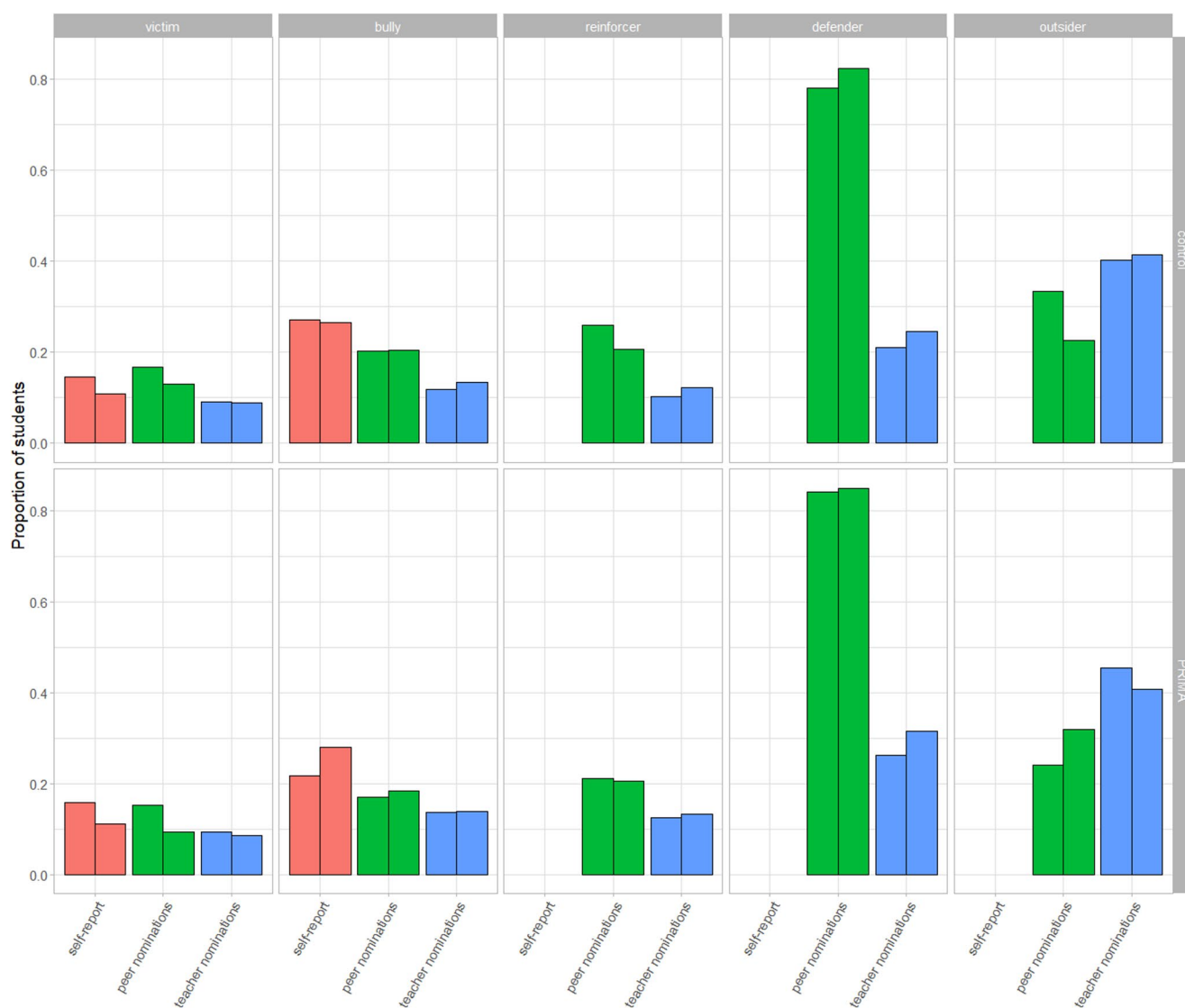


Fig. 1 Proportion of students assigned to a self- (red), peer (green), and teacher (blue) reported bullying role at both time points and for the control and intervention conditions ($N=3244$)

ORs indicate the relative change in agreement over time for teachers who consulted the monitoring report compared with those who did not. Non-significant effects are included for transparency. For the victim role, report consultation was associated with greater peer-teacher agreement ($OR=2.83$, $95\% CI[1.40-5.72]$). This means that the odds of agreement improved almost threefold for teachers who consulted the monitoring report compared with those who did not. However, no such effect was found for self-teacher agreement. In contrast, for the bully role no significant effects of monitor report consultation on agreement for either rater pair were found. For the defender, reinforcer and outsider roles, consulting the monitor report did not significantly affect peer-teacher agreement.

Teacher Training

Table 5 shows the effects of the PRIMA face-to-face training attendance on teacher reporting accuracy across bullying roles for teachers in the intervention condition. The ORs reflect the relative change in agreement over time for teachers who attended the face-to-face training compared to those who did not. Non-significant effects are included for transparency. For the victim role, attending the training significantly increased peer-teacher agreement, $OR=3.24$ ($95\% CI[1.62-6.49]$). This indicates that the odds of agreement improved more than threefold for trained vs. untrained teachers. However, training attendance was associated with a smaller increase in agreement between peers and teachers for the bully role, $OR=0.52$ ($95\% CI[0.28-0.95]$). This

Table 2 Proportion of (positive) agreement between teacher vs. self- or peer report for each bullying role regardless of intervention condition (N=3244)

Role	Teacher vs.	Observed agreement		Positive agreement	
		T0	T1	T0	T1
Victim	Self	0.81 (0.8–0.82)	0.86 (0.85–0.87)	0.24 (0.20–0.28)	0.30 (0.25–0.36)
		0.83 (0.82–0.84)	0.88 (0.87–0.89)	0.34 (0.3–0.38)	0.39 (0.33–0.44)
Bully	Self	0.73 (0.72–0.75)	0.70 (0.69–0.72)	0.27 (0.24–0.3)	0.29 (0.26–0.32)
		0.83 (0.81–0.84)	0.83 (0.82–0.84)	0.44 (0.39–0.48)	0.48 (0.44–0.52)
Defender	Peer	0.37 (0.35–0.38)	0.40 (0.39–0.42)	0.40 (0.38–0.42)	0.47 (0.45–0.49)
		0.77 (0.75–0.78)	0.79 (0.78–0.8)	0.33 (0.29–0.37)	0.37 (0.33–0.41)
Outsider	Peer	0.55 (0.53–0.56)	0.57 (0.56–0.59)	0.37 (0.34–0.41)	0.39 (0.36–0.43)

Note: Bold indicates $p < .05$ for change between T0 and T1

indicates that the improvement in agreement over time was about 48% lower for teachers who attended the face-to-face training vs. those who did not. For the defender and outsider roles, attending the training resulted in an increase in peer-teacher agreement over time, although the effect was not significant.

E-learning Participation

Table 6 shows the impact of fully completing the PRIMA e-learning modules on peer-teacher agreement across bullying roles for teachers in the intervention condition. The ORs indicate the relative change in agreement over time for teachers who completed the e-learning compared to those who did not. Non-significant effects are included for transparency. For the victim role (peer-teacher agreement), completing the e-learning was associated with a significantly greater improvement over time (OR=2.57, 95% CI[1.25–5.28]). This indicates that the odds of agreement increased about 2.6 times more for teachers who completed the modules than for those who did not. For the reinforcer role (peer-teacher agreement), e-learning completion also had a positive effect on the peer-teacher agreement (OR=1.52, 95% CI[1.04–2.23]). This reflects a 52% increase in the odds of agreement relative to teachers who did not complete the e-learning. In contrast, for self-teacher agreement on

Table 3 Intervention condition effect (i.e., PRIMA vs. control schools) on the observed agreement between teacher vs. self- or peer report (N=3244)

Role	Teacher vs.	Control		PRIMA		OR (95% CI)
		T0	T1	T0	T1	
Victim	Peer	0.80	0.86	0.85	0.89	0.79 (0.47–1.31)
Victim	Self	0.80	0.86	0.82	0.86	0.75 (0.46–1.24)
Bully	Peer	0.81	0.82	0.84	0.84	0.89 (0.56–1.43)
Bully	Self	0.71	0.70	0.74	0.71	0.86 (0.66–1.11)
Defender	Peer	0.36	0.37	0.37	0.43	1.33 (1.05–1.68)
Reinforcer	Peer	0.75	0.79	0.78	0.79	0.84 (0.63–1.13)
Outsider	Peer	0.58	0.55	0.53	0.59	1.50 (1.20–1.87)

Note: Bold indicates $p < .05$

Table 4 Effect of monitor report consultation on observed agreement between teacher vs. self- or peer report for teachers in the intervention condition (N=1855)

Role	Teacher vs.	No report consultation		Report consultation		OR (95% CI)
		T0	T1	T0	T1	
Victim	Peer	0.88	0.89	0.83	0.89	2.83 (1.40–5.72)
Victim	Self	0.82	0.88	0.81	0.85	0.55 (0.29–1.06)
Bully	Peer	0.84	0.83	0.84	0.84	1.27 (0.69–2.34)
Bully	Self	0.75	0.73	0.74	0.68	0.82 (0.58–1.14)
Defender	Peer	0.33	0.37	0.39	0.48	1.23 (0.92–1.66)
Reinforcer	Peer	0.78	0.79	0.78	0.79	1.00 (0.69–1.47)
Outsider	Peer	0.58	0.61	0.49	0.57	1.27 (0.96–1.69)

Note: Bold indicates $p < .05$

Table 5 Effect of teacher training attendance on the observed agreement between teacher vs. self- or peer report for teachers in the intervention condition ($N=1855$)

Role	Teacher vs.	Proportion agreement				OR (95% CI)
		No face-to-face Training		Face-to-face training attended		
		T0	T1	T0	T1	
Victim	Peer	0.88	0.89	0.82	0.89	3.24 (1.62–6.49)
Victim	Self	0.81	0.86	0.83	0.87	1.09 (0.59–2.03)
Bully	Peer	0.84	0.85	0.84	0.82	0.52 (0.28–0.95)
Bully	Self	0.73	0.70	0.76	0.71	0.87 (0.63–1.21)
Defender	Peer	0.39	0.42	0.35	0.44	1.29 (0.96–1.74)
Reinforcer	Peer	0.79	0.78	0.76	0.8	1.36 (0.93–1.99)
Outsider	Peer	0.57	0.61	0.48	0.57	1.18 (0.89–1.56)

Note: Bold indicates $p < .05$

Table 6 Effect of E-learning participation on the observed agreement between teacher- vs. self- or peer report for teachers in the intervention condition ($N=1855$)

Role	Teacher vs.	Proportion agreement				OR (95% CI)
		No e-learning		e-learning participation		
		T0	T1	T0	T1	
Victim	Peer	0.85	0.87	0.86	0.91	2.57 (1.25–5.28)
Victim	Self	0.80	0.86	0.83	0.87	0.78 (0.42–1.45)
Bully	Peer	0.83	0.82	0.85	0.85	1.44 (0.78–2.68)
Bully	Self	0.74	0.72	0.75	0.68	0.70 (0.50–0.97)
Defender	Peer	0.37	0.42	0.36	0.44	1.15 (0.86–1.55)
Reinforcer	Peer	0.79	0.78	0.76	0.81	1.52 (1.04–2.23)
Outsider	Peer	0.52	0.62	0.53	0.55	0.70 (0.53–0.93)

Note: Bold indicates $p < .05$

the bully role, e-learning participation was associated with a significantly smaller improvement over time (OR=0.70, 95% CI[0.50–0.97]). This indicates a 30% lower increase in the odds of agreement between teachers who did vs. did not complete the e-learning. Finally, for peer–teacher agreement on the outsider role, e-learning participation was associated with a significantly smaller improvement over time (OR=0.70, 95% CI[0.53–0.93]), that is, a 30% lower increase in the odds of agreement relative to no e-learning participation.

Discussion

The present study investigated the accuracy and potential of teachers as an information source for students' involvement in bullying. Specifically, we compared the accuracy (over time) of teacher-reports of students' bullying involvement with their student self- and peer report equivalents in a Dutch primary school sample. We also investigated whether teacher training through modules of the Dutch PRIMA bullying prevention program would improve teachers' reporting accuracy. In general, the findings underscore the potential of teachers as a reliable information source for students' bullying involvement and particularly after following teacher

training. However, the findings varied both across teacher training components and types of involvement in bullying.

First, regarding teacher reporting accuracy, we found moderate to high agreements between teacher reports vs. self- and peer reports. Agreements were strongest for the bully and victim roles. As expected, positive agreements (i.e., correctly identifying a student in a role between raters) were substantially lower than observed agreements (i.e., correctly identifying students in and not in a role between raters). Nevertheless, these findings counter previous notions of teacher reporting accuracy being limited because bullying unfolds outside of their awareness (Atlas & Pepler, 1998; Craig et al. 2000a) and/or is not recognized as such (Bauman & Del Rio, 2006; Bradshaw et al., 2007; Dawes et al., 2024). Furthermore, our findings show that the (positive) agreements between teachers vs. self- and peer reports improved over time. These improvements in agreement were most apparent in positive agreements between teacher vs. peer reports. This finding supports the claim that teachers' familiarity with classroom dynamics improves their ability to identify bullying involvement (Salmivalli, 2010). Moreover, this finding is in line with the previous finding that longitudinal exposure and relationship-building improve teachers' sensitivity to social interactions between students (Polanin et al., 2012). In short, our findings indicate

that teachers seem to have a better insight into their classroom social dynamics than previously expected.

Second, regarding the improvement of teachers' potential as information sources, the findings differed by training component, bullying role, and rater pair (i.e., teacher vs. self or peer report). Not all training elements were equally effective in increasing teachers' potential as an information source for classroom bullying dynamics. Across components, peer-teacher agreement for identifying victimization improved for teachers who consulted the diagnostic monitor report, attended face-to-face training, or completed the e-learning. For other roles, patterns differed by training component. Face-to-face training was associated with a smaller improvement in peer-teacher agreement for identifying engagement in bullying behavior. E-learning completion was positively associated with peer-teacher agreement for identifying reinforcer behavior, but was linked to a smaller improvement for outsider identification in peer-teacher agreement and a smaller improvement for identifying engagement in bullying behavior in self-teacher agreement. At the broader intervention level, peer-teacher agreement improved more over time for defending and outsider roles in PRIMA schools than in control schools. It must be noted that teachers' reporting accuracy was already quite strong for both bully and victim roles before teacher training. This may explain why further improvements through training, particularly in self-teacher agreement, were limited.

Overall, these quantitative findings align with recent qualitative work suggesting that teacher awareness in—and accuracy in reporting of—classroom bullying dynamics can be improved through targeted teacher training (Pronk et al., 2024). Our findings also add some nuance to this previous claim and echo a recent call for more interactive and context-specific professional development for teachers (Chen et al. 2020a). Not all types of teacher training may (equally) improve teachers' potential as an information source for students' involvement in bullying. While gaining insight into classroom dynamics through diagnostic monitor reports and face-to-face training seem effective, training through e-learning suggests a mixed picture. All in all, the findings suggest that specifically more intensive teacher training and learning from the experts (i.e., those directly involved) through diagnostic monitor reports can be key to improving teachers' reporting accuracy.

Some limitations of the present study need to be acknowledged. First, we compared teacher reports with self- and peer reports. As indicated in the introduction, all these reporters for involvement in bullying may suffer an eye of the beholder's bias (i.e., subjectivity in reporting). Future studies with more objective measures for involvement in bullying such as direct observations and experimental studies are needed to further validate the present findings. Moreover,

while agreement between teachers and students improved over time, our findings also showed that, even after training, teachers identified fewer students who engaged in bullying behavior than students did about themselves or their peers' behavior. Future research should explore the specific contexts in which these discrepancies between raters might emerge. That is, do these discrepancies arise because the bullying unfolds outside of their classroom and awareness or in their classroom when their attention is divided. Identifying such contextual conditions would allow schools to supplement teacher observations more strategically, such as by increasing adult supervision in out-of-class settings or enhancing training to help teachers recognize more subtle in-class bullying behaviors. More knowledge about these situational dynamics could provide a concrete pathway toward improving bullying detection and prevention efforts.

Finally, the generalizability of our findings may be limited. While we had access to a large dataset, the data were only collected in the Netherlands in regular primary schools. The findings may therefore not (fully) generalize to other geographic regions (e.g., the Americas and/or Asia) due to demographic sample composition and/or differing educational contexts (e.g., special and/or secondary education). Finally, the present study used teacher training modules from the PRIMA program. It is unclear whether similar effects will be obtained when using teacher training modules from other programs and/or other types of teacher training. However, based on Pronk and colleagues (2024), there is at least qualitative supportive evidence that teacher training—both face-to-face and through learning from expert diagnostic reports—in general is effective.

These limitations notwithstanding, our study contributes to the ongoing debate in the literature regarding the best information sources for students' bullying involvement in classroom dynamics. While self- and peer reports are widely used (e.g., Kärnä et al., 2011; Juvonen et al., 2001), both types of reports are subject to biases such as social desirability in responding and reputational effects (e.g., Gromann et al., 2013). The present findings suggest that teachers' reporting of bullying involvement—especially after targeted teacher training—could provide a valuable complementary perspective to self- and peer reports. Moreover, teacher reports reduce the reliance on student (self-) disclosure of ethically sensitive topics (e.g., physical or psychological harm through bullying), therefore mitigating some of the ethical concerns posed by students' (self-) reporting of classroom bullying dynamics.

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Author Contributions IE and JP conceived the research idea, designed, and initiated the study. MF and ZH provided constructive feedback during the study design phase and on multiple manuscript drafts. IE performed the statistical analyses and developed the methodological approach for the results section. JP contributed the theoretical background and framing of the study. All authors were actively involved in writing, revising, and fine-tuning the manuscript, and approved the final version for submission.

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Data Availability This study is based on a secondary data analysis from a longitudinal intervention study investigating the implementation and effectiveness of the PRIMA program (van Verseveld et al., 2021). The datasets analyzed during the current study are not publicly available due to privacy and ethical restrictions but can be accessed upon reasonable request to the first author of this manuscript.

Declarations

Ethics Approval Ethical review approval was granted by the Faculty of Social and Behavioral Sciences' ethical board at the University of Amsterdam (approval number: 2016-CDE-8008). The trial was registered in the ISRCTN register (file number: 15425978).

Consent to Participate Consent to participate was obtained from all individual participants included in the study.

Consent to Publish Consent to publish was obtained from all participants for anonymized data reporting.

Competing interests The authors declare no competing interests.

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