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Do teachers know their students? Examining teacher attunement in secondary schools

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Abstract

Using survey data from 457 Italian sixth grade secondary school students (*M* age = 11.9, SD = 0.7, 46% girls) and 58 of their teachers (*M* age = 45.7, SD = 9.4, 92.8% female) this study examined the extent to which secondary school teachers were attuned to their students. More specifically, we investigated the extent to which teachers were aware of which students were highly liked, disliked, prosocial, aggressive, or engaged in risky behavior. For each of these five dimensions, teacher attunement was measured by comparing teacher's nominations to the proportion of received peer nominations per student. Then, a general teacher attunement score was constructed by calculating the mean of these five scores. Descriptive analyses showed a moderate teacher attunement, which was highest for prosocial behavior and lowest for risk behavior. It was investigated whether certain teachers had a higher attunement than others. Our analyses showed that teacher attunement was positively associated with the amount of time teachers spent with their students and with their experience as a teacher. Furthermore, attunement was negatively associated with classroom size.

Keywords

attunement, peer nominations, secondary schools, teacher attunement, teachers

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Background

Teachers are not only responsible for their students' cognitive development, but are also responsible for tackling social issues, such as aggression and exclusion (Kinderman, 2011). In the daily classroom management, teachers act as an 'invisible hand' (Cairns & Cairns, 1994) that can guide the classroom in new interactions and norms, by subtly shaping social networks and status systems (Rodkin & Gest, 2011). Through network-related practices, attitudes, and beliefs, teachers have several opportunities to unobtrusively foster positive relationships while preventing problematic social behaviors (see Hamm & Hoffman, 2016 for a complete review). In order to successfully promote positive relationships among students, teachers need to be aware of the social dynamics in the classroom (Farmer, McAuliffe Lines, & Hamm, 2011).

Over the years, a few studies have investigated the extent to which teachers are aware of the social dynamics in their classrooms. These studies typically compared teacher reports to reports of their students, as the assessments provided by multiple informants (e.g. all students in a class) are considered the most accurate account of classroom social dynamics (Gest, 2006). The extent to which these reports overlap has been referred to as *teacher attunement*. Hamm, Farmer, Dadisman, Gravelle, and Murray (2011) first conceptualized teacher attunement as a dimension of teachers' involvement in their relationships with the students. According to Ahn and Rodkin (2014, p. 1146), teacher attunement is: 'teachers' knowledge of the social characteristics of their students as their students perceive them'.

The aim of the present study was to examine the extent to which secondary school teachers were attuned to their students and whether teachers with certain characteristics had a higher attunement than others. Specifically, we investigated five dimensions of attunement that are relevant for teachers on a daily basis: Likeability, dislikeability, prosociality, aggression, and risk behavior. For instance, in order to tackle aggressive behavior, teachers need to know which students are the aggressors (Dawes et al., 2017). When bullying occurs, it is useful when teachers know which students tend to behave prosocially as these students may be willing to help the victim. Furthermore, as teachers are important social referents for peer liking (Hendrickx, Mainharad, Boor-Klip, & Brekelmans, 2017), teachers' knowledge about students' reputational behavior could enable them to intentionally orient peer preferences (Ahn & Rodkin, 2014), i.e., hinder the association between risk or aggression and status and promote a positive association between prosociality and status.

Studies investigating attunement have generally found large discrepancies between reports of teachers and students regarding bully-victim dyads (Ahn, Rodkin, & Gest, 2013) and victimization (e.g., Oldenburg et al., 2016). Additionally, studies reported only a moderate teachers' accuracy in identifying students peer membership (e.g., Gest, 2006; Pearl, Leung, VanAcker, Farmer, & Rodkin, 2007). It was also found that more attuned teachers were better at managing the social dynamics in the classroom. Teacher attunement to peer groups was associated with adolescents' perceptions of the school social affective context and

bullying (Hamm et al., 2011) and with higher rates of social integration (Hoffmann, Hamm, & Farmer, 2015). Several studies have documented the impact of attunement—with respect to several students' social characteristics, such as victimization and aggression—on students' peer experiences. It was found that teacher attunement to victimization contributed to create a positive environment in which students have a higher sense of school belonging (Gest, Madill, Zadzora, Miller, & Rodkin, 2014) and peer acceptance (Madill, Gest, & Rodkin, 2014). Furthermore, students were more likely to intervene in bullying in classrooms where teachers were more attuned to victimization (Norwalk, Hamm, Farmer, & Barnes, 2015) and less inclined to reward aggression with status when teachers were attuned to status and aggression (Ahn & Rodkin, 2014).

Only a few studies (e.g., Hamm et al., 2011; Norwalk et al., 2015) investigated teacher attunement in secondary schools. During the transition from primary to secondary school, several factors contribute to weaken the potential for teachers' influence and the teachers' role in guiding students' social development tends to becomes more 'invisible' behind the primary role as a transmitter of information (Kindermann, 2011). On the one hand, at this developmental stage, peer cliques gain prominence as reference structures (Brown & Klute, 2003) and teachers are less likely to have a direct influence on students' adjustments without attending social dynamics (Bierman, 2011). On the other hand, secondary school teachers have a larger and less homogeneous group of students and spend less time with these students than primary school teachers. Hence, teachers' opportunities to be involved in students' peer experience are likely to diminish and, as result, they could be less attuned.

We also investigated whether teachers with certain characteristics had a higher attunement than others. Understanding which characteristics are associated with attunement may enable more effective training of teachers. In the following section, we discuss three teacher characteristics that we expected to be associated with attunement.

Teacher characteristics and teacher attunement

Time spent with students. The more time teachers spend with their students, the more opportunities to acquire information about the social dynamics in the classroom they have. Accordingly, we hypothesize a positive relationship between the amount of time that teachers spend with their students and teacher attunement (hypothesis 1).

Experience. Teachers' experience might affect their attunement to the social dynamics in the classroom. Although Gronlund (1951) found no relationship between attunement and teachers' experience, it seems reasonable that attunement is a skill that teacher can develop over time. Consistent with this, Van Hattum (1997) argued that more experienced teachers are better at recognizing bullying because they have been exposed to it more frequently. We hypothesize a positive relationship between teachers' experience and teacher attunement (hypothesis 2).

Job related well-being. Being a teacher is a demanding job that may lead to poorer health of teachers and, eventually, lower commitment and performance (Hanaken, Bakker, & Schaufeli, 2006). Teachers who do not feel well at work might mainly focus on students' cognitive development, as the most fundamental part of their job, whereas teachers who enjoy their job are generally more engaged. We hypothesize a positive relationship between teacher attunement and teachers' job-related well-being (hypothesis 3).

The present study: Context, aims, and hypotheses

The Italian secondary school system. In Italy, students enroll in secondary school when they are approximately 11-year-old. The classroom composition is constant throughout the year and does not change per subject. Thus, students have (almost) all subjects together with the same group of classmates. The weekly program consists of about 30 hours of lessons. The list of subjects (and the number of weekly hours per subject) are defined by the minister of education and they are the same in every school: Italian, history and geography (9), mathematics and science (6), English (3), second foreign language (2), technology (2), music (2), arts (2), sport (2), catholic religion (1), and one supplementary hour on literary topics. Normally, there is one teacher in every class per every one of these subjects. The number of teachers and the number of hours that each teacher covers weekly always remains the same throughout the year. Students remain mainly in the same classroom and teachers travel to different classes. Depending on the daily program, students generally interact with four or five different teachers every day.

Aims and hypothesis. Summarizing, the purpose of this study was to examine the extent to which secondary school teachers were aware of which students were highly liked, disliked, prosocial, aggressive, or engaged in risky behavior. In addition, we investigated whether certain teachers had a higher attunement than others. We expected teacher attunement to be positively associated with the amount of time teachers spent with their students (hypothesis 1), teachers' experience (hypothesis 2), and teachers' job related well-being (hypothesis 3).

Method

Sample and procedure

We used data from 457 Italian first year secondary school students (M age = 11.9, SD = 0.7, 46% girls) and 58 of their teachers (M age = 45.7, SD = 9.4, 92.8% female) in 23 classrooms across nine schools. The data were collected in 2015–2016 and were part of a local project ('provaci ancora Sam'), endorsed by the regional office of the minister of education aiming at decreasing school dropout in secondary schools. In addition, this project received funds from a larger

European project ('2young2fail'). The data used in the current study were collected during the spring of 2016, implying that the teachers and students have known each other for approximately half a year.

The schools that participated in the study were located across the urban area of Turin and were more or less spread evenly over the different neighborhoods in the city. About 54% of the students were of Italian origin, 9% had one parent of foreign origin, and 36% had both parents of foreign origin. According to statistics released by the local office of the Ministry of Education, about 30% of students in Turin in this age group have a foreign nationality (Manca, 2016).

Student questionnaire. Students filled out a questionnaire using tablets, supported by a teacher and two research assistants who were present in the classroom during the data collection. Prior to the data collection passive parental consent was asked. None of the parents objected to their children's participation in the study, which is most likely due to the endorsement of the minister of education. Students' participation was voluntary and they could stop their participation at any point. Students were assured that the questionnaire was anonymous and that their answers would be treated confidentially.

Teacher questionnaire. The teacher questionnaire was also administered using tablets. We collected the teachers' data on the same day in which we collected the students' data. Although every class had about ten teachers in total, the number of teachers that accepted to participate differed per classroom. In 14 classrooms, two teachers filled out the questionnaire, in six classrooms three teachers, and in three classroom four teachers. We communicated to schools that we preferred that Italian ($N = 23$) and mathematics ($N = 15$) teachers completed the questionnaires, because these teachers have the most contact with their students and thus are likely to know them best. Only a few teachers in our sample taught English ($N = 4$) French, music, technology, art, sport, and religion ($N < 4$ teachers per subject). Although all teachers teach in a number of classes (varying according to the subject), there were no teachers in our data who reported on more than one classroom. In other words, each teacher in the dataset belonged to only one classroom.

Dependent variable: Teacher attunement

Five dimensions of attunement. In order to compare teachers' reports to peer reports (i.e., students' reports on each other), teachers and peer nominations were collected following the recommended practices used in the peer assessment literature (Cillessen & Bukowski, 2000; Veenstra, Dijkstra, Steglich, & Van Zalk, 2013). Using tablets, pupils and teachers had access to a drop down menu with a complete non-alphabetical class roster. They could nominate as many students, who best fit each of several sociometric and behavioral descriptors, as they wished in their classroom, by tapping on their names. As stated above, consent rate in the study was high, most likely due to the previous endorsement of the minister of education.

Only the students who were not in classroom during the data collection were missing in the sample. The average participation rate was 84%, with a minimum value of 61% and a maximum of 100%. Therefore, all the classrooms were included in the analysis. Below we have specified how each of the five dimensions of teacher attunement was measured.

Likeability. Students were asked which classmates they liked most. Teachers were asked which students were liked most by their classmates.

Dislikeability. Students were asked which classmates they liked least. Teachers were asked which students were liked least by their classmates.

Prosociality. Students were asked which classmates help them when they have problems, for example with their homework. Teachers were asked which students help their classmates often.

Aggression. Students and teachers were asked which students fight often.

Risk behavior. Students and teachers were asked which classmates do things that are forbidden (e.g., fighting, stealing, drinking alcohol, damaging property, and smoking).

Combining teacher and peer reports into attunement variables

In this study, we compared teacher reports to peer reports concerning individual students. As teacher reports were collected as individual nominations, in order to construct the attunement variables, the following steps were taken.

First, the students' mean proportion of received nominations was calculated by dividing the number of nominations that each student had received by the total number of other students that participated in the questionnaire in that classroom. For instance, when a certain student received 10 likeability nominations within a classroom of 21 participating students, this student would score 0.50 on the likeability variable.

Subsequently, we standardized these proportions using the mean value in each classroom. Then we dichotomized the scores based on these standard values. All scores larger than 1 were coded 1 and all scores smaller or equal to 1 were coded 0. As an alternative, we could have computed the attunement scores using nonparametric correlations between teacher and peer report scores. However, the distribution of all peer-report variables except likeability was remarkably skewed, with many students receiving no nominations. Therefore, we chose to follow the approach adopted by other studies focusing on attunement to children's individual characteristics (Gest et al., 2014; Serdiouk, Rodkin, Madill, Logis, & Gest, 2013) and use cut-off points.

Then, the teacher reports were compared to these dichotomous variables. There was teacher attunement when teacher i had nominated student j and student j had a score of one. Put differently, the following formula was used:

$$\frac{A}{B}$$

where A = the number of accurately identified students by a certain teacher; B = the number of students who received a number of peer nominations larger than one standard deviation above the classroom mean.[1] Finally, we computed a general teacher attunement score by calculating the mean of the five scores. This variable ranged from 0–1, where a score of 0 reflects no attunement at all and a score of 1 reflects complete attunement.

Our choice to combine five scores into one general attunement score is based on two arguments, one theoretical and one empirical. Most importantly, from a theoretical point of view, attunement was first introduced as teachers' awareness of friendship relationships among students (Hamm et al., 2011) and then applied to other social characteristics, but it is generally defined unidimensionally, as a concept referring to teachers' knowledge of students' social characteristics (e.g., Ahn & Rodkin, 2014). Therefore, we argue that the general involvement associated with teachers' attunement is likely to influence their scores on all dimensions of attunement that are investigated. Different dimensions of attunement have been operationalized differently in the literature (see Gest et al., 2014), thus it was often impossible to combine them. However, in this study we have five dimensions of attunement all measured as proportions of correctly identified students in each of the five categories considered. Thus, combining them produces a general score that is still interpretable as a (mean) proportion of 'correct answers'.

From an empirical point of view, using different operationalizations of attunement typically gives relatively low, sometimes even slightly negative, correlations (e.g., Madill, Zadzora, & Gest, 2016). In our study, all correlations are positive and most are significant, except for prosociality attunement. Assuming, as we do, that one unidimensional characteristic of the teachers influences their five scores, combining them into one general score is likely to improve the quality of the measurement.

Independent and control variables

Table 1 displays the descriptive statistics for the independent and control variables.

Independent variables: Teacher characteristics

Time spent with students. The number of hours that teachers taught weekly in each class strictly depends on the subject that they teach, as described above. The variable thus reflects the time spent with all students in class. The mean number of hours spent per week was 5.36 (SD = 2.98).

Table 1. Descriptive statistics five dimensions of teacher attunement, dependent, independent and control variables ($N = 58$).

	Range	Mean	SD
Likeability	0–1	0.33	0.31
Dislikeability	0–1	0.34	0.29
Prosociality	0–1	0.56	0.32
Aggression	0–1	0.36	0.31
Risk behavior	0–1	0.22	0.22
Combined Attunement	0–1	0.46	0.21
Time spent with students (hours per week)	1–9	5.36	2.98
Experience	4–40	21.72	9.39
Job related well-being	2.58–5.08	3.87	0.62
Mean number of nominations given	0.4–7.6	2.95	1.33
Classroom size	15–25	21.02	3.14

Experience. Experience was operationalized using the number of years since graduation because we do not have information on the years of experience. In Italy, careers in the public administration tend to be generally rigid. Therefore, the number of years since graduation can be considered an acceptable proxy for experience. The mean experience was 21.72 (SD = 9.39).

Job related well-being. Teachers' well-being was measured using Warr's (1990) well-being at work scale. This scale consists of 12 items (e.g., when you are at work, how often do you feel: Happy, enthusiastic, optimistic, calm, satisfied, relaxed, tense, uneasy, worried, unhappy, pessimistic, depressed). Answers ranged from never (1) to always (6). A mean score was calculated per teacher (Cronbach's alpha = 0.86). The mean score on this scale was 3.87 (SD = 0.62).

Control variables

Teachers' sex. Empathy affects teachers' involvement and understanding toward complex social dynamics (Mishna, Scarcello, Pepler, & Wiener, 2005). As sex differences seem to influence the level of individual empathy (Duy, 2013), we controlled for teachers' sex (not shown in Table 1). Females (92.8%) were coded as one, males were coded as zero.

Mean number of nominations given. Teacher reports were collected following an unlimited nominations procedure. Accordingly, as attunement is measured as the proportion of correctly identified students, nominating more students could lead to an artificially high attunement score, by chance. Therefore, we controlled for the mean

number of nominations given by teachers on the five dimensions. The mean score on this measurement was 2.95 (SD = 1.33).

Classroom size. Attunement tends to be lower in classrooms with more students (Neal, Cappella, Wagner, & Atkins, 2011). Accordingly, we controlled for classroom size ($M = 21.02$; SD = 3.14).

Analysis

As teachers are hierarchically nested within classrooms, we have a multilevel structure with relatively few clusters. Therefore, we used OLS regression models with standard errors corrected (robust) for clustering within class (Huber, 1967). The models were estimated using Stata 12 (Rabe-Hesketh & Skrondal, 2012). The results were compared to those obtained with a multilevel model with two levels (teachers nested in classrooms) but no substantive differences were found. Accordingly, we chose to present the results of the OLS model with standard errors corrected for clustering within class.

Based on Cook's distance one outlying teacher was identified. This teacher was a 62-year-old teacher and had an extremely low attunement score (i.e., 0). This was partly due to the low number of total given nominations (i.e., 4). This teacher was eliminated from the regression model, leaving 57 valid observations.

Results

Descriptive results: Teacher attunement

Descriptive statistics for the nominations given by teachers on each of the attunement dimensions can be found in Appendix A (see Online Supplemental Materials). Most nominations were given for prosociality ($M = 4.91$, SD = 3.51) and least nominations were given for risk behavior ($M = 1.65$, SD = 1.63).

Table 1 displays the descriptive statistics of the five dimensions of teacher attunement. The mean score is relatively uniform, except for prosociality and deviance. Prosociality is the dimension with the highest mean attunement score ($M = 0.56$, SD = 0.32) and risk behavior has the lowest mean attunement score ($M = 0.22$, SD = 0.22). The mean within-teacher standard deviation is 0.33, with a range from 0.09–0.51.

The correlation matrix of the five dimensions, predictors and control variables are presented in Table 2. As the distribution of the five dimensions is discrete and right-skewed, we opted for nonparametric correlations (Kendall's τ_b). All correlations are positive and most are statistically significant, in spite of the low number of teachers ($N = 58$). Correlations are slightly lower and not significant for prosociality.

We computed the teacher's attunement score as mean of the five scores obtained on these dimensions. This variable could range from 0 to 1, with a mean score of

Table 2. Bivariate nonparametric correlations (Kendall's τ_b) between attunement dimensions, predictors and covariates ($N = 58$).

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Likeability	–									
2. Dislikeability	0.26*	–								
3. Prosociality	0.04	0.18	–							
4. Risk behavior	0.27*	0.22*	0.02	–						
5. Aggression	0.22*	0. 12	0.05	0.30*	–					
6. Time spent with students	0.25**	0.26**	0.16	0.11	0.15	–				
7. Experience	0.32***	0.07	−0.05	0.16	−0.01	0.16	–			
8. Job related well-being	−0.08	−0.07	−0.02	−0.16	−0.07	−0.13	−0.14	–		
9. Mean number of nominations given	0.36***	0.16	0.3**	0.2*	0.35***	0.26**	0.07	−0.06	–	
10. Teachers' sex (female = 1, male = 0)	−0.05	−0.04	−0.03	−0.09*	−0.01	−0.01	0.01	0.03	−0.07	–

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

0.46 (SD = 0.21), suggesting that on average teachers' perceptions overlap with the students' perspectives in almost half of the cases. The lowest attunement score was 0, the highest attunement score was 0.8.

In the remainder of the results section, the results for the combined attunement variable are discussed. However, we also analysed the five dimensions separately (see Appendix B, Online Supplemental Materials). The results of these analyses are generally consistent with the results of the analysis on the combined attunement variable. The predictors that are statistically significant differ between the five separate models, but, as argued above, by creating a combined attunement score, we treated teachers' attunement as a unique underlying ability measured on five separate tasks, on theoretical ground.

Teacher characteristics and teacher attunement

The results of the OLS regression analysis are presented in Table 3. In model 1, we only included the three control variables, in model 2 we added our main predictors. The regression weights reported are unstandardized. While much of the variance can be explained simply by classroom size and the mean number of nominations given ($R^2 = 0.44$), the explained variance in model 2 is significantly higher than in model 1 ($R^2 = 0.645$), indicating that our predictors improved the model. We found a positive relationship between teacher attunement and the amount of time teachers spent with their students (hypothesis 1) ($b = 0.023$, $p < 0.001$). We found support for a positive relationship between attunement and teachers' experience

Table 3. OLS regression on combined attunement indicator ($N = 57$), unstandardized weights.

	Model 1		Model 2	
	B	SE	B	SE
Intercept	0.780***	0.175	0.671**	0.217
Time spent with students			0.023***	0.004
Experience			0.005**	0.002
Job related well-being			−0.037	0.031
Mean number of nominations given	0.089**	0.024	0.061**	0.018
Teachers' sex (female = 1, male = 0)	−0.115	0.063	−0.139*	0.063
Classroom size	−0.023***	0.005	−0.023***	0.005
R^2	0.440		0.645	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

(hypothesis 2) ($b = 0.005$, $p = 0.005$). No support for a positive relationship between attunement and teachers' job related well-being (hypothesis 3) was found.

We controlled for teachers' sex and found that female teachers had a lower attunement than male teachers ($b = -0.139$, $p = 0.039$). However, because there are only four male teachers this result could be due to chance. Predictably, teachers who nominated more students have a higher attunement ($b = 0.061$, $p = 0.003$). Finally, we found that there was a lower teacher attunement in classrooms with more students ($b = -0.023$, $p < 0.001$).

Discussion

Using data from 457 Italian first year secondary school students and 58 of their teachers, this study examined the extent to which secondary school teachers were aware of which students were highly liked, disliked, prosocial, aggressive, or engaged in risky behavior.

Consistent with previous studies on teacher attunement to peer groups (e.g., Gest, 2006; Pearl et al., 2007), a moderate overlap between the reports of teachers and students was found. Teacher attunement was highest for prosocial behavior and lowest for risk behavior, possibly because prosocial behavior is behavior that students want to show-off to their teachers, whereas risk behavior is behavior that they try to hide from them. We argue that it is important that teachers are aware that they may not always be attuned to the social dynamics and it is plausible that they are more attuned to positive behavior than to negative behavior.

The mean attunement score of 0.46 may imply that some teachers do not know their students well, even though they had interacted with them for at least half a year. The discordance between teacher and peer reports could be (partly) due to inaccuracy of the peer reports. Although peer reports are considered the gold

standard (Gest, 2006), it may be that peers are unaware of certain social dynamics (e.g., see Oldenburg et al., 2015). This concern seems to be the strongest for risk behavior. However, given that behavior is often driven by perceptions rather than by the actual circumstances, perceptions are important per se (see Krackhardt, 1987; Pittinsky & Carolan, 2007).

Given the importance of attunement in promoting positive school environment, it is crucial to understand how teacher attunement can be stimulated in order to design effective school policies. Although the mean attunement score was 0.46, it varied from 0 to 0.8, suggesting differences between teachers. As expected, we found that teachers were more attuned when they spent more time with students, possibly because they have more opportunities to acquire information about them. Although future research is needed, this finding may be used as an argument to minimize the number of different teachers per classroom. If this is not feasible, for instance due to the different specializations of teachers, schools could consider introducing a mentor system whereby students meet mentors on a regular basis and discuss their well-being with them.

Moreover, in line with our expectations, we found that teachers were more attuned to their students when they had more experience. This result suggests that attunement may tend to increase over time, as teachers grow in experience. Accordingly, teacher trainings may improve by focusing not only on teaching and the cognitive development of students, but also on recognizing social dynamics in the classroom.

Consistent with Neal et al. (2011), attunement was negatively related to classroom size, probably because keeping track of behaviors and attributes of the students becomes more difficult in larger classrooms. This finding is also consistent with Oldenburg and colleagues (2015) who found less overlap between self-reported and peer reported victimization in larger classrooms. As public funds are generally becoming scarce and public education recently faced severe cuts in many countries, developing training programs dedicated to increase teachers' attunement could be a strategy to cope with the lack of resources that force schools to form increasingly large classes. As attunement seems to grow with experience, schools could give tailored training to their teachers and assign smaller classrooms to young, less experienced, and less attuned teachers. In addition, schools could exploit teachers' social networks to promote the diffusion of attunement skills among inexperienced teachers.

Against our expectations, no support for a positive relationship between teacher attunement and teachers' job-related well-being was found. Furthermore, controlling for teachers' sex we found that female teachers have a lower attunement than male teachers. However, because there were only four male teachers in the sample, this result could be a fluke.

Limitations

Our sample of teachers was relatively small. However, our results are reasonably consistent with other studies and do not appear to be driven by peculiarities concerning the sample.

In the present study, there was teacher attunement when *i* and *j* both nominated student *k*. Although in our analyses we controlled for the number of nominations given, this implies that our attunement score did not account for errors of commission, i.e., there was no 'punishment' for incorrectly nominating students. However, the advantage of the measurement we used is that the score can be straightforwardly interpreted as a mean proportion of 'correct' answers.

As we compared dichotomous answers of the teachers with the students' right-skewed counts of nomination received (peer reported), we had to choose cut-off points for the latter. There is no straightforward way to choose the cut-off point of the peer nominations, thus we opted for a 'statistical' solution based on the standardized values. This implies that, depending on the distribution of nominations in each classroom, about 15% of students who had received the most peer nominations were selected in each category. As this is a rather strict procedure, it is possible that teachers mentioned names of students that were not included in this group. Nevertheless, using a general attunement score almost all predictors included in the model were statistically significant and we obtained a high proportion of explained variance, indicating that our procedure produced a rather valid measurement of attunement.

Finally, we collected both peer and teacher reports using a drop-down menu with a complete non-alphabetical class roster. As the roster was not randomized for every respondent, this procedure may cause names at the top of the list to receive more nominations (see Poulin & Dishion, 2008). Looking at correlations between ranking and number of nominations received, we found a significant correlation ($p < 0.05$) in the expected direction for two of our attunement variables (risk behavior and aggression). However, the magnitude of these correlations was small ($r < 0.1$). Moreover, for one dimension (likeability) we found a similar correlation in the opposite direction, i.e., names at the bottom of the roster received slightly more nominations. As we used the same roster for both teachers and students, this potential bias is likely to affect teachers and pupils in the same way. Therefore, our attunement score is unlikely to be systematically under- or over-estimated. Yet, on the basis of this finding, we recommend researchers investigating attunement to supply randomized rosters to their respondents.

Directions for future research

Future studies can follow up on this study by investigating other teacher characteristics that may be associated with teacher attunement. For instance, it is plausible that teachers' perceptions of their role affect their involvement with the students. Teachers who believe that their main task is to increase the knowledge of their students, may have a lower attunement than teachers who also focus on the social-emotional well-being of their students. Furthermore, it would be interesting to investigate which strategies teachers apply to find out how their students are doing. For instance, teachers who organize meetings with individual students to find out how they are doing could have a higher attunement. Finally, teachers do

not operate in a vacuum, but are embedded in a system with peers and managers. Future studies could investigate whether there is more attunement when teachers feel supported by their peers and managers and whether teachers discuss their classrooms' characteristics with their peers. A pilot study on bullying in primary schools suggested that teachers do not discuss their students' well-being and behavior in a structural way (Oldenburg, Bosman, & Veenstra, 2016).

Conclusion

In a nutshell, this study suggests that attunement varies considerably among secondary school teachers and is associated with teacher characteristics (i.e., time spent with students and work experience). Future research should aim at understanding how teachers can make use of this knowledge to tackle problems such as bullying, aggression, isolation and promote a collaborative and fruitful class environment. In addition, future research could investigate other (teacher) characteristics associated with teacher attunement.

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Note

1. We also computed the attunement scores using the formula proposed by Serdiouk et al. (2013). The general attunement score obtained with this formula correlates at $r = 0.83$ with the one presented here and the analyses conducted using either one of the two indices yielded similar results. We chose to use the index described above because it is straightforwardly interpretable as a proportion of correctly identified students.

Supplemental material

Supplemental material is available for this article online.

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