

Development and preliminary psychometric study of the student version of the Teacher-Student Relationship Scale

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Abstract: This study developed a version for students of the Teacher-Student Relationship Scale and evaluated its psychometric characteristics. In line with its teacher version, this student version intends to evaluate conflict and closeness as dimensions characterizing teacher-student interactions. Qualitative evaluation (i.e. via thinking aloud) of the instrument with a group of eight 7th grade students showed that the instrument had good facial validity. The instrument was then applied to 297 students, boys and girls, attending the 7th through 9th grade. The two-factor internal structure of the instrument was confirmed, and both factors had good internal consistency values; furthermore, this measurement model proved invariant by sex. This instrument will allow (re)addressing the student's perspective on his / her relationship with the teacher and may allow further work into how this perception can impact on several aspects of the intra and interpersonal functioning of both student and teacher.

Keywords: *Teacher; Student; Relationship; Validation; Psychometrics.*

Desenvolvimento e estudo psicométrico preliminar da versão do aluno da Escala Relação

Professor-Aluno: Este estudo desenvolveu uma versão para alunos da Escala de Relação Professor Aluno e avaliou as suas características psicométricas. Coincidente com a versão do instrumento dirigida ao professor, a versão para o aluno pretende avaliar as dimensões do conflito e proximidade presentes nas interações entre o professor e o aluno. A versão do aluno foi qualitativamente avaliada (i.e., via reflexão falada) e apresentou boa validade facial. O instrumento foi, então, aplicado a 297 alunos do sétimo ao nono ano de escolaridade, de ambos os sexos. Confirmou-se uma estrutura interna do instrumento em dois fatores, ambos com boa consistência interna; este modelo de medida mostrou também ser invariante por sexo. Este instrumento permitirá (re)conhecer a perspetiva do aluno sobre a sua relação com o professor, bem como explorar a forma como esta perceção pode ter impacto em diversos aspetos do funcionamento intra e interpessoal do aluno e do professor.

Palavras-chave: *Professor; Aluno; Relação; Validação; Psicometria.*

The teacher-student relationship plays an essential role in the achievement of academic success and the development of social and behavioral skills (Patrício, Barata, Calheiros, & Graça, 2015). Still, this may depend on the quality of the established relationship, which in turn depends on what both teacher and student bring into the day-to-day interactions (i.e. teacher's support and concern, students respect; Hughes, 2012). Besides transmitting knowledge, teachers must also invest in building empathic relationships with students that may contribute to students' holistic development and success (Brait, Macedo, Silva, Silva, & Souza, 2010). Such relationship is associated with several academic success factors (e.g., academic motivation, involvement in the school, diminished behavioral problems, development of positive relationships and of socio-emotional competencies; Gomes, 2012), and with positive peer relationships (Hughes, 2012).

The quality of the teacher-student relationship has been conceptualized as organized into two dimensions, namely conflict and closeness, which may have an impact on internalizing or externalizing behavior trajectories of students (Hughes, 2012). Conflict, as negative, unpredictable and unpleasant interactions, relates to a problematic relationship process between the teacher and the student, which tends to exacerbate over time. Closeness refers to positive affect and communication between teacher and student; the greater the communication of positive affection, the greater the closeness between teacher and student (Tsigilis, Gregoriadis, & Grammatikopoulos, 2017).

The conflict and closeness dimensions are evaluated by the Teacher-Student Relationship Scale (Pianta, 1992), which intends to consider the perspective of teachers about the quality of their

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relationship with each student. This instrument has been used extensively and in diverse cultural contexts, namely Portugal and Brazil. Psychometric investigation into its Portuguese version concurs with a two-factor (i.e., conflict and closeness) structure, with both constructs presenting good internal consistency values (Patrício, Barata, Calheiros, & Graça, 2015). This study points to the fact that teachers evaluated their relationships with their students as being based on more closeness than conflict. Similar psychometric results were found for the Brazilian version concerning its internal structure and internal consistency indicators (Petrucci, Borsa, Barbosa, & Koller, 2014). Furthermore, Petrucci and collaborators (2014) considered students' sex differences and reported that teachers tend to evaluate their relationships with female students as closer than their relationship with male students.

The literature give greater emphasis to the teacher's perspective on his/her relationship with the students (e.g., Barbosa, Campos, & Valentim, 2011; Baker, Grant, & Morlock, 2008; Runions & Shaw, 2013; Tsigilis, Gregoriadis, & Grammatikopoulos, 2017) than to the students' perspective of this relationship. The perspective of students, especially the older ones (i.e., adolescents), may be particularly relevant, because it is their perception on what the teacher expects from them. The way teachers relate to students them may also have an increased impact on their behavior and academic investment (Martinelli, Schiavoni, & Bartholomeu, 2009). Moreover, being able to assess the teachers and the students perspectives on that relationship using similar constructs might prove useful for unequivocally investigating the mutual impact they have on each other's behavioral patterns, which has been point out, particularly for disruptive behavior (Maia, 2009; Nelson & Roberts, 2000)

Thus, the aim of this study was to develop and psychometrically evaluate a student version of the Teacher-Student Relationship Scale. Alike the original teachers' version, we expect to find confirmation on the instrument evaluating the dimensions of conflict (unpleasant, negative and unpredictable interactions with the teacher) and closeness (open communication and affection). Both factors are expected to present at least good internal consistency indicators. Furthermore, we tested for measurement invariance of the two-factor internal structure, which has not, to our knowledge been previously ascertained even in the case of the original teachers' version of the instrument.

METHOD

Participants

The participants of this study constitute a non-probabilistic sample of 297 students, 166 girls (55.9%) and 131 boys (44.1%), who attended the 7th grade ($n = 90$, 35.7%), 8th grade ($n = 101$, 30.3%) and 9th school grade (34%). Upon data collection, participants were aged between 12 and 15 years old ($M = 13.47$, $SD = 0.97$). Most of these participants had never been retained in the same school year before ($n = 26$, 87.87%) and a little over half of them had not been subjected to a disciplinary measure due to inappropriate behavior ($n = 157$, 52.9%).

Measurements

Student Version of the Teacher-Student Relationship Scale –short form [SV-TSQ-SF; Versão Aluno da Escala de Relação Professor-Aluno – Versão Aluno]. The Student Version of Teacher-Student Relationship Scale – short form is composed of 16 items and was developed to evaluate the student's perspective on the quality of the relationship with his/her teachers, thus resulting from the adaptation of the Teacher-Student Relationship Scale (Pianta, 1992; cf. Results section), which as shown to be psychometrically sound (cf. Introduction section). It contains nine items related to conflict dimension (i.e. unpleasant, negative and unpredictable student-teacher interactions) and seven items relating to closeness dimension (i.e. open communication and affection between student and teacher). Items are rated using a five-point scale, ranging from 1 (i.e., has nothing to do with what happens to me) to 5 (i.e., is exactly what happens to me).

Procedure

Participants were recruited based on geographic convenience from two public schools in the northern region of Portugal. Schools were contacted after the General Directorate for Education approved the study; in turn, students were contacted only after the schools' boards gave permission and their legal guards gave informed consent for their participation. Students were also informed on the goals of the study and on the confidentiality, anonymity and voluntary nature of their participation; finally, they were asked verbal assent. Inclusion criteria were being between 12 and 15 years old at the time of data collection and exclusion criteria were presence of specific educational needs that might question the way the self-report instruments were understood and answered. Participants who assented and were eligible

to the study were asked to fill in the questionnaire within their classrooms, using time made available by their teachers; participation took about 10 to 15 minutes.

A two-step approach for data analyses was taken. First, the instrument was developed, and its facial validity and understandability was investigated based on a thinking aloud strategy. Then, the psychometric properties of the instrument, namely its factorial validity and internal consistency were assessed. A confirmatory factor analyses approach was adopted for factorial validity, given that the instrument was developed to mirror closely its two-factor teacher version, which has been previously ascertain; a one-factor model was also tested for comparison purposes. Then, the measurement invariance of the best fitting model by sex was investigated; we sought for strong measurement invariance (i.e., metric and scalar invariance) as it is necessary for conducting reliable group comparisons (Dimitrov, 2010). The scores of boys and girls were then compared via latent mean comparison. Finally, the internal consistency of the instrument was also reported, based on the Cronbach alpha values.⁷

RESULTS

Development of the Student Version of the Teacher-Student Relationship Scale – Short form

All items were adapted to refer to the students' perspective instead of the teachers' point of view. To guarantee that the student version of the item related as closely as possible to its original intended content, we considered both the original English version of the items (Pianta, 1992), its Portuguese version (Patrício et al., 2015) and its Brazilian version (Petrucchi et al., 2014). Items 4, 7, 10, 12 and 14 required the greatest attention to guarantee the content to be appropriate as considered by students⁸. Table 1 shows the process of adapting one item pertaining to conflict (i.e., item 14) and one item pertaining to closeness (i.e., item 7), contrasting their original English, Portuguese and Brazilian versions into an adapted Portuguese version that was afterwards subjected to a thinking aloud procedure. It should also be noted that the original items referred to a specific student, whereas we proposed a general approach to teachers (and not to any one specific teacher); this option intended answers not to be biased by students choosing to reply based on one specific teacher they particularly liked or disliked.

Table 1. Adaption of item from a teachers' perspective to a students' point of view

Item 7	
English version	This student spontaneously, shares information about himself/herself.
Brazilian version	Essa criança compartilha espontaneamente informações sobre si mesma.
Portuguese version	Este/a aluno/a partilha espontaneamente informação acerca de si próprio/a.
Adapted version	Partilho, espontaneamente, informações sobre mim com os/as professores/as.
Final version	Partilho informações sobre mim com os/as professores/as por vontade própria.
Item 14	
English version	This student is sneaky or manipulative with me.
Brazilian version	Essa criança é dissimulada ou manipuladora comigo.
Portuguese version	Este/a aluno/a é sorrateiro/a ou manipulador/a comigo.
Adapted version	Os/as professores/as são enganadores ou falsos comigo.
Final version	Os/as professores/as mentem-me ou enganam-me.

The thinking aloud procedure took place in a public school in the northern region of Portugal and intended to ascertain if students understood the items as addressing their intended content. Eight 7th grade students, four boys and four girls, were randomly selected and asked to read the instrument in its entirety and then discuss it together. After reading and exchanging ideas, students themselves suggested some changes orally so that the intended contents could be more easily understood. After this procedure, a final version of the items was achieved (cf., Table 1).

⁷ Confirmatory factor analyses and measurement invariance analyses were conducted using the Mplus v7.4 software (Muthén & Muthén, 2012). The Cronbach alpha values were computed using the IBM SPSS v.24 software.

⁸ Further information on the adaptation process for all those five items may be requested from the corresponding author.

Psychometric analyses on the Student Version of the Teacher-Student Relationship Scale – Short form

Preliminary data analyses showed between 1 to 5 missing values for 20 participants, which were not missing completely at random (MCAR $\chi^2_{(193)} = 296.66$, $p < .001$) and so were dealt with via multiple imputation. Data was also found not to be multivariate normal (Mardias' $\chi^2_{(55.79)} = 2575.74$ for skewness and $\chi^2_{(341.71)} = 18.63$ for kurtosis with $p < .001$) and so the Maximum Likelihood Robust estimator was used for CFA and measurement invariance analyses.

The two-factor model portraying closeness and conflict was found to be a better fit for the data than the one-factor model⁹. However, for its fit to be acceptable for boys and girls considered separately and thus configural invariance be found, it was necessary to allow for three residual correlations¹⁰ (cf. Table 2).

Table 2. Fit indices for confirmatory factor analyses and measurement invariance analyses

	χ^2	df	RMSEA (90% CI)	CFI	SRMR
One-factor model	540.84	104	.119 (.109; .129)	.40	.131
Two-factor model	267.46	103	.073 (.063; .084)	.78	.074
Two-factor model modified	198.87	100	.065 (.046; .069)	.87	.068
Male participants	150.36	100	.062 (.040; .082)	.86	.083
Female participants	194.28	100	.075 (.059; .091)	.80	.081
Baseline model	339.08	198	.069 (.057; .082)	.83	.082
Full metric invariance	357.83	214	.067 (.055; .079)	.83	.087
Full scalar invariance	395.08	228	.070 (.058; .082)	.80	.090
Partial scalar invariance	378.19	226	.067 (.055; .079)	.82	.087

Note: All χ^2 values were significant at $p < .001$. df = degree of freedom, RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual

For this modified model, loading values ranged from .380 for item 6 and .671 for item 5 for the closeness factor and from .308 for item 15 and .654 for item 8 for the conflict factor in the complete sample. For boys, loading values varied between .397 for item 7 and .681 for item 9 and between .335 for item 4 and .607 for item 8 for the closeness and conflict factors respectively. For girls, loading values varied between .356 for item 6 and .720 for item 5 and between .115 for item 15 and .713 for item 8 for the closeness and conflict factors respectively; in this case, exclusion of item 15 worsened the fit of the model.

Using the complete sample, both factors achieved good internal consistency values ($\alpha = .77$ for closeness and $\alpha = .72$ for conflict) and they were not significantly correlated ($r_s = -.02$, $p = .75$). Similar results were found by gender: $\alpha = .78$ and $\alpha = .74$ for closeness and conflict respectively and $r_s = .10$, $p = .28$ for boys and $\alpha = .76$ and $\alpha = .72$ for closeness and conflict respectively and $r_s = -.04$, $p = .61$, for girls.

Following configural invariance, full metric invariance was further achieved ($\Delta\text{RMSEA} = .002$, $\Delta\text{CFI} = .003$, $\Delta\text{SRMR} = .005$); in turn, only partial scalar invariance was achieved ($\Delta\text{RMSEA} = .000$, $\Delta\text{CFI} = -.01$, $\Delta\text{SRMR} = .000$)¹¹ after allowing the intercepts of items 1 and 6 to vary between male and female participants. Latent mean comparisons indicate that there are no significant differences between boys and girls on the closeness and conflict reported ($p > .05$). Table 3 presents the descriptive values for those measures.

⁹ The models' fit was considered acceptable if at least two of the following adjustment indices abided by the necessary thresholds: Root Mean Square Error of Approximation (RMSEA) $\leq .08$, Comparative Fit Index (CFI) $> .09$, or Standardized Root Mean Square Residual (SRMR) $< .10$. Furthermore, lower values of RMSEA and/or SRMR and higher values of CFI were considered indicative of better fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

¹⁰ Residual correlations were added between items 7 and 16, both portraying conflicts, and between items 11 and 13 and items 12 and 15, all relating to closeness. As only two items were associated at a time, the hypothesis of an underlying construct addressing the specific variance of those items was not considered plausible.

¹¹ Criteria for deciding on invariance at the metric and scalar level were taken from the guidelines provided by Chen (2007): for metric invariance, $\Delta\text{CFI} < -.01$, combined with $\Delta\text{SRMR} < .03$ or with $\Delta\text{RMSEA} < .03$; for scalar invariance, $\Delta\text{CFI} < -.01$, combined with $\Delta\text{SRMR} < .03$ or with $\Delta\text{RMSEA} < .01$.

Table 3. Descriptive values for the closeness and conflict measures

	Complete sample (N = 297)	Male participants (n = 131)	Female participants (n = 166)
Closeness	20.46 (5.33)	20.80 (5.62)	20.20 (5.11)
Conflict	16.12 (5.33)	16.36 (5.25)	15.93 (5.40)

Note: Results are presented as *M* (*SD*)

DISCUSSION

Teacher-student relationship may have a noteworthy impact on the psychosocial and academic performance of students, particularly in its conflict or closeness dimensions (Patrício et al., 2015). Still, to our knowledge, only the teachers' point of view has been considered, leaving out the students' perspective on how this interaction unfolds. Because human beings react to the way they perceive their world (more than to its objective characteristics) it may be the case that students' perspective impact more strongly on their behavior than the teachers' point of view (Martinelli et al., 2009). The current work sought to develop and psychometrically evaluate an instrument to assess students' perspective, based on an instrument concerning the teachers' point of view that had been proven sound (i.e., Student-Teacher Relationship Questionnaire; e.g., Patrício et al., 2015; Petrucci et al., 2014; Pianta, 1992; Tsigilis et al., 2017).

In line with the version of the instrument intended for teachers, the student version of the Teacher-Student Relationship Scale was found to be organized into two dimensions (i.e., conflict and closeness) as main descriptors of the teacher-student relationship; both achieved good internal consistency values. Those dimensions were not significantly associated, though its correlation value was negative; previous works with teachers' samples show not only a negative but also a significant correlation (Patrício et al., 2015; Petrucci et al., 2014; Pianta, 1992). These findings seem to point to some specific perspectives, depending on the respondent, which should be further analyzed. This may be particularly relevant in the case of boys, given that, even if non-significant, the correlation between conflict and closeness was positive.

Gender-based measurement invariance of the two-factor structure had not been previously addressed in relation to teacher-student relationships. We found evidence on such invariance, which allows greater confidence in gender-based comparisons (Chen, 2007). Our findings indicate that boys and girls report similar levels of conflict and closeness to their teachers. This is not in line with previous works based on the teachers' perspective that show that teachers perceive to relate differently to their male and female students (Patrício et al., 2015; Petrucci et al., 2014; Pianta, 1992). These previous studies did not consider the teachers' gender as in our study, which may sustain future works. The current work used a relatively small sample size, which was restricted to the 7th to 9th grade students, and did not gather data on which to further evaluate the construct validity of the instrument. Future works may consider using larger and more diverse samples. Other ways of assessing student-teacher relationships (e.g., observation) may also be useful for establishing the construct validity of the student (and teacher) versions of the instrument.

This study provides preliminary evidence on an appropriate tool to evaluate the student's perspective, as he/she may be the most credible rapporteur of his/her behavior. Specifically, the student version of the Student-Teacher Relationships Scale was found to have a theoretically relevant and consistent internal structure that is applied to both boys and girls. Such an instrument was not previously available and may prove useful in further exploring several aspects relating to teacher-student relationship, namely how it affects the psychosocial development, social behavior, or academic performance of students. Promoting higher quality teacher-student relationships may come to be conceptualized as a way of improving all of those indicators, aiming for the holistic development of students.

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