Supporting Students' Engagement with Teachers' Feedback: The Role of Students' School Identification

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Abstract

This study explored the link between teachers' feedback and students' behavioural engagement with school identification. Using a sample of 2534 students from 6th to 12th school year, we examined whether their perceptions about teachers' feedback were related to their behavioural engagement and mediated by their school identification. We also explore whether this relation was moderated by students' year of schooling and by the type of secondary course they were enrolled and the differences of latent means between these groups. Results confirmed the expected mediation: teachers' feedback was associated with an increased behavioural engagement via increased school identification. Only the type of students' secondary course moderated this relation. Students in the 12th year perceived that their teacher used less effective feedback and felt lower school identification than students in the early years of schooling. These finding illustrated the underlying mechanism through which teachers' feedback affect students' behavioural engagement with school.

Keywords: teachers' feedback, school identification, behavioural engagement, school year, educational tracks

Supporting Students' Engagement with Teachers' Feedback: The Role of Students' School Identification

In school, the accomplishment of tasks and activities is part of students' daily life. Consequently, most of the time, students are confronted with the feedback of teachers and colleagues regarding their performance (Hattie & Timperley, 2007). In the cognitivist perspective, feedback is a consequence of performing, as "information provided by an agent (e.g. teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (Hattie & Timperley, 2007, p. 81). Its purpose is to enable the gap between the actual performance and the desired one based on observable performance.

Researchers such as Hattie and Timperley (2007), inspired by the work of Hannafin and colleagues in the 90s, show the four types of feedback – task, process, self-regulation and self – that have a different impact on students' learning gains. Task feedback emphasises information and activities to clarify aspects of the learning task. Process feedback focuses on what the student can do to proceed with the task. Self-regulation is related to the metacognitive elements – how to monitor and evaluate the strategies used. All these levels are considered adequate and essential for students' learning. Feedback at the self-level is focused on personal attributes, with limited positive consequences for learning, which is why it is considered non-effective (Hattie, 2012).

Feedback from teachers or colleagues is an aspect that is present in learning dynamics that take place in the classroom and arises in research as a critical concept when discussing ways to improve students' school performance (Hattie, 2012; Van der Kleij, Feskens, & Eggen, 2015).

Boud and Molloy (2013) argue that feedback has a behavioural emphasis that focuses on the external provision of information. The danger of this idea in a classroom context is the association that feedback is telling the student how to perform well. However, the power of

feedback in changing the performance of learners occurs when considering feedback from a socio-constructivist perspective. Feedback is seen as facilitative in that it involves the provision of observations and comments to enable students to construct, through dialogue, new understanding and actively encourages them to formulate knowledge without dictating the "good" performance (Boud & Molloy, 2013). According to Boud and Molloy (2013), feedback supports education when: involve students in dialogues about learning; help students to monitor and assess their performance; design assessment tasks that facilitate students' engagement; enhance students' capacities for on-going learning. Therefore, in the present study, we examined whether students' perceptions about teachers' feedback will be related to increased students' engagement and explored a potential underlying mechanism for this effect.

Teachers' Feedback and School Identification

Although there is a large amount of evidence of supporting the usefulness of feedback to promote student learning (e.g., Evans & Waring, 2011), students, as learning subjects, develop complex relationships with the various school contents, as well as with the different educational agents. These personal, academic, and social experiences are essential elements of student's identification with the school. According to Voelkl (2012), the development of feelings of identification, or non-identification, with the school is a reflection of the students' school experiences. For the author, identification is a process characterised by evolutionary dynamics of schooling and identity development, as a longitudinal axis where, as age advances and students progresses in the levels of schooling, there are changes in their dispositions towards the school. These dispositions are the result of continuous paths and dynamics, whether characterised by success or failure. The solidification of these dispositions generates spirals of identification or resistance with the school experiences (Abrantes, 2003).

Teachers' feedback is one of the school experiences. When feedback respects students' agency in their process of learning, it can promote students' identification with school because it develops the dispositions of using feedback to raise their awareness of the quality of their performance (Carless & Boud, 2018).

Wenger (2007) defines identification as part of the process of identity construction, translating into investment relationships, which may be association or differentiation, participation or non-participation. School identification develops in the dynamics of how the student sees him/herself as a student and how he/she positions him/herself and participates inside and outside the classroom, that is, how he/she is engaged in school activities. On the view of Voelkl (2012), school identification is a set of affective responses likely to have a high impact on school behaviour engagement and ultimately on academic achievement. Therefore, the development of school identification can facilitate academic successes and the failure to identify with the school could generate barriers to high performance (Voelkl, 2012).

Teachers' Feedback, School Identification and Behavioural Engagement

In general terms, engagement refers to the quality of student's relationship with the school-enterprise, therefore with the people, activities, objectives, values, and places that make it up from the most energetic, enthusiastic, focused, and emotionally positive interactions about academic tasks, to those characterised by an apathetic departure (Skinner, Kindermann & Furrer 2009). Engagement is a range of activities a learner employs to generate the interest, focus, and attention required to build new knowledge or skills.

Jimerson, Campos, and Greif (2003) suggested that school engagement is a multifaceted construct that includes behavioural, cognitive and affective dimensions. The behavioural dimension comprises elements such as attendance, classroom participation (question-posing and question-answering) and extracurricular activities involvement. The cognitive component includes self-regulation, learning goals, perception of the relevance of

schoolwork for future endeavours and the importance given to the knowledge or skill to be gained. And finally, the affective dimension, that includes the student's aspiration of being integrated in a school group or a school team, the relationships with teachers and peers, and his/her autonomy. The present study focuses on the behavioural dimension, the most studied (Lawson & Lawson, 2013) and the one which most theories agree on (Olivier, Galand, Hospel, & Dellise, 2020). Students behavioural engagement is frequently associated with actions such as students' participation in school activities, time devoted to homework and its completion, and academic success.

Engagement consistently is founded as a robust predictor of student performance in the classroom (Buhs, Ladd, & Herald, 2006; Fredricks, Blumenfeld, & Paris, 2004; Klem & Connell, 2004; Putwain, Symes, Nicholson, & Becker, 2018). Students engaged in school are more likely to get higher grades and test scores (Jelas, Azman, Zulnaidi, & Ahmad, 2016; Perry, Liu, & Pabian, 2010; Putwain et al., 2018; Wang & Zhang, 2020). Engagement is also an antidote to student alienation (Fredricks et al., 2004; Rosário et al., 2017) and to improve their attendance (Klem & Connell 2004). It is considered a precursor to long-term academic achievement, eventual completion of school (Connell, Spencer, & Aber, 1994) and lower dropout rates (Tavares, Carvalho & Santos, 2015). In contrast, students who demonstrate low levels of engagement are more likely to suffer long-term adverse consequences that include disruptive behaviour in class, absenteeism, and school dropout (Archambault, Janosz, & Pagani 2009; Janosz, Archambault, Morizot, & Pagani, 2008; Rodríguez & Conchas 2009).

Theoretically, engagement and school identification are related to each other and achievement (Johnson, Crosnoe, & Elder, 2001; Voelkl, 2012). A student who feels identified with his/her school is more likely prompting positive academic (exert effort and participated in school and classroom activities) and social behaviour (Voelkl, 1997). Low levels of school identification had also been associated with negative school behaviours, like aggression and

school delinquency (Hill & Werner, 2006; Payne, 2008; Stewart, 2003). Students identified with their school and engaged in its activities do better academically, but academic success is also likely to enhance engagement and school identification (Finn, 1989; Johnson et al., 2001; Voelkl, 2012).

Students' engagement and school identification are constructs of particular interest to educators. They are factors that – unlike predictive variables such as gender, ethnicity, or social class – present themself as malleable and thus partially under the control of teachers and schools for the social interactions that they generate but which can also be altered (Fredricks et al., 2004). That is the crucial goal of feedback: to promote students' active participation in learning and their school identification (Wang & Zhang, 2020). Students behaviour affects his or her external environment and teachers feedback information may affect the students.

Theoretical and empirical research supports the importance of teachers' relationships with students for the development of engagement and school identification (Voelkl, 2012). Teachers' encouragement contributes to students' school identification (Hughes & Kwok, 2007). Students who receive an optimal level of teacher support – by showing concern for students' well-being, setting clear standards for their academic and social behaviour, and encouraging student autonomy – were more likely to be engaged in the school (Klem & Connell, 2004; Liu et al., 2018; Perry et al., 2010). When students demonstrate their engagement through on-task behaviours, questions, or completed work, they often elicit reciprocal engaging reactions from teachers. Research has shown that when students are engaged, their teachers tend to provide them with more motivational support and assistance (Furrer & Skinner 2003; Monteiro, Mata, Santos, Sanches & Gomes, 2019; Skinner et al., 2009).

Voelkl (2012) theoretical model suggest that contextual facilitating conditions (as teachers' use of effective feedback) contributed to students' identification with school, and that this identification contribute for their behavioural engagement in the school activities, leading to academic achievement and attainment. Yet, the specific role of teachers' feedback in school identification is understudied, and we did not find any studies that relate these constructs directly. On the other hand, there is a growing research interest in the use of teacher feedback to improve students' academic achievement through the increase of students' engagement (Jelas et al., 2016; Jonsson & Panadero, 2018; Price, Handley, & Millar, 2011; Wang & Zhang, 2020).

The Present Study

The current research extends previous studies in several ways, a) by examining, for the first time, the role of feedback on school identification; and b) by examining school identification mediator role between feedback and behavioural engagement. We aimed to explore the link between students' perceptions about Portuguese teachers' feedback and students' identification with school and explore if this link could explain students' behavioural engagement. But we also wanted to examine changes in these constructs and their relationship as age advances, and they progress in the levels of schooling. Voelkl (2012) suggested that, over time, identification with school crystallizes and provides internal motivation for continued behavioural engagement, even in the absence of external motivators or the contextual facilitating conditions. Therefore, we expect to find more robust relationships between teachers' feedback, students school identification and behavioural engagement in the early years. On the other hand, we expect to see stronger links between school identification and behavioural engagement in the last years of schooling, because students increase their sense of belongingness, the value they attribute to school and

academic performance, and also establish patterns of consistent classroom engagement (Voelkl, 2012).

An additional goal of this study was to explore the difference in teachers' feedback and students' school identification and behavioural engagement in a subsample of secondary school students from two different courses: the sciences and humanities (S&H), aimed to prepare students for higher education, and the professional courses, intended to provide students with technical competencies that allow them to get into the labour market (Fernandes, 2009). In the Portuguese context, the professional courses are considered a positive discrimination measure to combat school failure, being their target audience secondary school students with trajectories of failure and at risk of dropping out (Alves, Guimarães, Marques, & Cavaco, 2014). Alves and colleagues (2014) study pointed to a general feeling of disaffiliation towards school, so we expect to find a lower level of school identification in this population. We want to understand the underlying mechanism of this reality concerning their perceptions of teachers' use of feedback and their behavioural engagement, thereby examining the mediating role of students' identification with school.

Building on these aims, four research questions guide our study:

- Is there a relationship between students' perceptions about teachers' use of feedback and their identification with school?
- Does students' school identification mediate the association between their perceptions about teachers' use of feedback and their behavioural engagement at school?
- Is the relationship among teachers' use of feedback, students' school identification and behavioural engagement moderated by their year of schooling and by the type of secondary course they are enrolled?

- Are there differences between students attending different years of schooling and different type of secondary course on their perceptions about teachers' use of feedback, school identification and behavioural engagement?

Method

Participants

Participants were 2534 students (50.3% females) from public (73.4%) and private Portuguese schools (26.6%), aged between 10 and 25 (M = 14.22, SD = 2.46). Students were in 6th (20.3%), 7th (13.6%), 9th (28.2%), 10th (24.3%) and 12th year of schooling (13.7%). The 961 students (38% of the students) in secondary education were mostly enrolled in the S&H courses of sciences and humanities (69.3%), while 30.7% were enrolled on professional courses.

Measures and Procedures

All students who participated in the study had to provide previous parental consent, and before participating, the researcher informed them that their participation was voluntary and anonymous. Participants completed a paper-and-pencil questionnaire or an online survey during class time in the presence of a teacher.

We used the Questionnaire Feedback, Identification and School Trajectories (QFIST; from Carvalho et al., 2015) to assess a) students' perceptions about teachers' use of feedback, b) student identification with school, and c) student behavioural engagement. On the Teachers' Feedback scale, developed by Carvalho et al. (2014), participants evaluated their teachers' use of Effective Feedback and Non-Effective Feedback. Therefore, eight items focused in the use of feedback at the process and self-regulation level (Hattie & Timperley, 2007, e.g., "The teachers explain what is expected to learn in the discipline", "the assessment grades are communicated and explained to each student"). Three items focused in the use of non-effective feedback at the self-level (Hattie & Timperley, 2007, e.g., "When

communicating classifications, my teachers make unpleasant comments", "The teacher says to do better, but does not say how"). Participant answered all eleven items on a 4-point Likert scale (0 = Never to 3 = Always).

The School Identification scale was authored by Conboy et al. (2015), based on Voelkl studies (1997, 2012). Participants were asked to indicate, on a 4-point scale (0 = complete disagree to 3 = completely agree), to what extent they agreed or disagreed with ten statements. Four items were related do their Intrinsic Value as students (e.g., "My skills make me confident about my future"). Three items referred to the Practical Value of the school (e.g., "The grades I have at school determine my future"). Finally, three statements were concerning about their feelings of Belonging and Well-being associated with their school (e.g., "I am happy in this school").

Finally, students' behavioural engagement in the school was assessed through a nine-item scale authored by Carvalho et al. (2016). This scale bifurcates behavioural engagement into two subtypes: academic work (e.g., time on task) and participation, as suggested by Appleton, Christenson, Kim, and Reschly (2006) and Christenson et al. (2008). Students were asked to indicate, on a 4-point scale (0 = never to 3 = always), the frequency of their engagement in Academic Work (six items, e.g., "I study the content of the lesson") and their Class Participation (three items, e.g., "I actively participate in group discussions").

Analysis

Testing Measures' Structural Validity and Reliability

To test the fit of the measures used to assess the contruct in the study, we used confirmatory factor analysis (CFA) with MPLUS (v. 8.2) (Muthén & Muthén, 1998-2017). For the 11 items assessing students' perceptions about teachers' use of feedback, we tested a two-factor model (teachers' use of 1 – Effective Feedback and 2 – Non-Effective Feedback), as suggested by the authors of the scale (Carvalho et al., 2014). For the nine items assessing

student's behavioural engagement, we tested a two-factor model (1 – Academic Work and 2 – Class Participation), as suggested by Carvalho et al. (2016). Finally, for the ten items assessing school identification we tested a three-factor model (student's 1 – Intrinsic Value, 2 – Practical Value and 3 – feelings of Belonging and Well-being related to school), as suggested by Conboy et al. (2015).

The CFAs were conducted using the estimator weighted least squares mean and variance (WLSMV) and a polychoric correlation matrix. This estimator is considered less biased and more accurate in estimating the factor loadings (λ) of ordered categorical data (Li, 2016). Missing data were handled by the default Mplus procedure (were missingness is allowed to be a function of the observed covariates but not the observed outcomes – Muthén & Muthén,1998-2017). Each measure model fit was assessed using the following indices: chi-square (X^2); comparative fit index (CFI); Tucker-Lewis index (TLI); and root mean square error of approximation (RMSEA). We follow cut-off point recommendations of Hair, Black, Babin, and Anderson (2014) for assessing the goodness of fit indices criteria for samples higher than 250 and number of observed variables less or equal to 12 – CFI ≥ .97, TLI ≥ .95; RMSEA ≤ .07 (with confidence interval [.00, .08]). We used Composite reliability (CR) to assess factors internal consistency, following the approach of Colwell (2016).

To ensure that our measures were assessing the same construct in all our comparison groups (by school year and by type of secondary course), we test their measurement invariance. We used the procedures described by Svetina, Rutkwoski, and Rutkwoski (2020), using Wu and Estabrook proposal for ordered categorical measures. According to Wu and Estabrook, after establishing configural invariance, threshold invariance is tested first, followed by the invariance of the factor loadings. This procedure is the opposite from the invariance testing in continuous variables, where equal factor loadings are tested first, followed by the invariance testing in intercepts/threshold (e.g., Dimitrov, 2010; Putnick &

Bornstein, 2016). Invariance were examined with the chi-square difference test ($\Delta\chi^2$), changes in CFI (ΔCFI), and changes in RMSEA (ΔRMSEA). In this regard, a significant result in chi-square difference test and values of $\Delta CFI \leq -.01$, supplemented by values of $\Delta RMSEA \geq .010$ were indicative of non-invariance (Chen, 2007).

Testing the Validity of the Theoretical Model

After confirming measure invariance, the latent factors assessed by the measures were replaced with the scale total scores estimated from CFA, following the approach of Wang and Wang (2020). Mplus imputed plausible values repeatedly (five sets of values) for each latent variable based on the Markov chain Monte Carlo (MCMC) Bayesian estimation. The use of plausible values produces more accurate estimates of factor variances and factor correlations than factor scores and gives less biased slopes (Asparouhov & Muthén, 2010). These values were used as "observed variables" to make the model parsimonious, reducing the structural equation model that tested the relation between the variables in the study to its second-order hierarchical model, as presented in Figure 2. We used Robust maximum likelihood (MLR) estimator, since the plausible values were on a continuous scale. Model fit indices (X^2, CFI, TLI, and RMSEA) were used to assess the theoretical model, as described early.

Testing the Moderation Effects of School Year and Type of Course

To study the moderation effects of school year and type of secondary course over our theoretical model, we used a multiple-group analysis and test models invariance across the groups. We first test the configural, factor loadings, and intercepts invariance, following Dimitrov (2010) procedures for continuous variables. Them, we examine the structural path invariance, using Wang and Wang (2020) methods. Again, in the comparison between nested models, if the model fit worse (by presenting lower CFI and higher RMSEA, according to the cut-off point references given previously), the theoretical model was considered non-invariant. In situations in which there was no perfect invariance for a specific parameter, but

neither was evidence of their complete inequality, we used modification indices (MI) to achieve a model with partial-invariance across the groups, as described by Dimitry (2010) and Wang and Wang (2020). We considered that moderation effects were confirmed if the model proved to be non-invariant at the level of the structural path. MI and estimates' p-values were used to identify the origin of the group's differences (Wang & Wang, 2020).

Testing for Latent Mean Differences

To estimate the differences between students of different school years and type of courses, we use multiple-group models, following the approaches presented by Thompson and Green (2013). We test model invariance at the factor means level (by constraining all means to zero), after confirming that the factor loadings, intercepts and structural paths were invariant (or partial-invariant) across de groups. If there was non-invariance at the means level, we concluded that there was a significant difference between the means of the groups. MI and estimates' p-values were used to identify the origin of the group's differences (Wang & Wang, 2020).

Results

Preliminary Analysis

The goodness-of-fit of all the measure models is reported in Table 1. As we can see, the two-factor model for the measure of teachers' use of feedback was adequate to our sample. Only the values of probability of the chi-square test were indicative of poor fit, but significant *p*-values were expected in an extensive sample like ours (Hair et al., 2014). Both factors presented adequate levels of reliability (CR for Effective Feedback was .91 and for Non-Effective Feedback was .82).

The two-factor model of the students' behavioural engagement measure also presented a well fit and reliability was adequate for the two factors (.86 for Academic Work and .73 for Class Participation). Only the three-factor model of students' school identification

presented less suitable fit. A review of the modification indices (MI) revealed several large values for residual covariances between several items, which appears to result from overlapping item content. As suggested by Byrne (2012), once at a time, we correlated the items indicated by the MIs: items 9 and 6, 9 and 5 (all three items from the Intrinsic Value factor), 9 and 7 (from the Practical Value factor, but both items referring to students grades), and items 4 and 3 (from the Practical value and the Belonging and Well-being factor respectively, both referring peer relationships). The modified model presented a very acceptable fit (cf. Table 1). Reliability values were also adequate (CR = .70 for Intrinsic Value, .82 for Practical Value and .75 for Belonging and Well-being).

All trajectories in the measures were statistically significant, and most of the items had $\lambda \geq .50$, as can be observed in Figure 1. Item 9 of the school identification scale had lower factor loadings, probably because of their covariances with items 5, 6 and 7. Also, question 3 from the Belonging and Well-being scale from school identification presented low factor loadings. Still, we maintained the item since its removal did not improve the model or the scale reliability.

Once defined our measures baseline model, we tested their invariance across students' year of schooling and type of secondary course. The results are presented in Table 2. Some of the *p*-values of the $\Delta\chi^2$ were significative, but there were almost no decrease of CFI and most of the RMSEA fit values mostly improved when thresholds and factor loadings were constrained to be equal across the groups. These results indicated us that, for all the instruments, measurement invariance held for all comparisons by school year and course. Students from different school years and secondary courses gave the same meaning to the items in the questionnaire. Therefore, all constructs can be meaningfully tested across groups (Putnick & Bornstein, 2016).

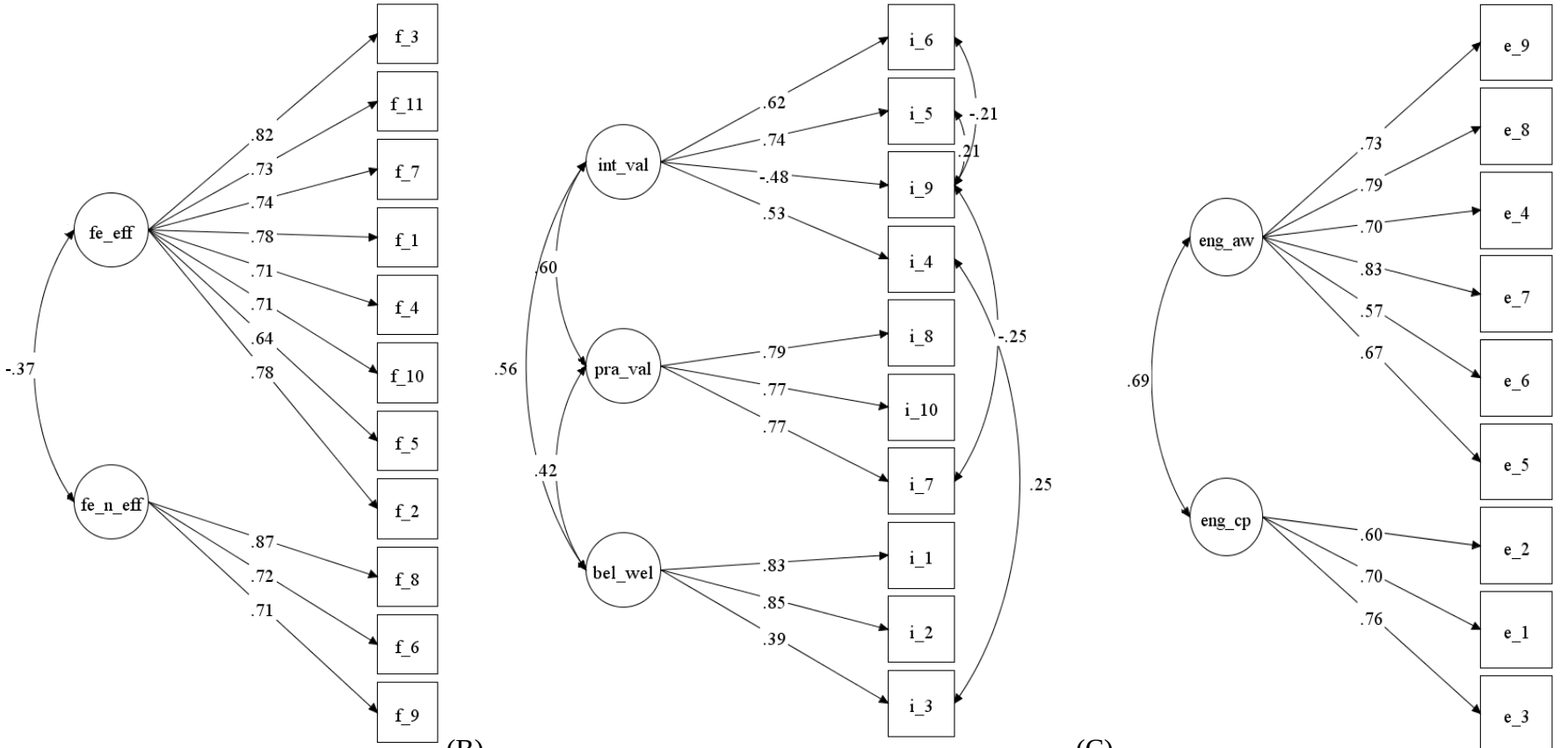
Table 1

Goodness of Fit Indices for the Measure Models

	X^2					RMSEA			
Measure	Value	*df*	*p*	CFI	TLI	Value	LL 90% CI	UL 90% CI	*p*
Teachers' Feedback (n = 2522)	433.23	43	< .001	.979	.974	.060	.055	.065	.001
School identification (n = 2534)	613.51	32	< .001	.947	.926	.085	.079	.091	< .001
School identification with MIs [a] (n = 2534)	344.19	28	< .001	.971	.954	.067	.061	.073	< .001
Behavioral engagement (n = 2521)	235.94	26	< .001	.982	.975	.057	.050	.063	.048

Note. Confirmatory Factor Analysis with WLSMV Estimator. MIs = Modification indices; CFI = comparative fit index; TLI = Tuker-Lewis index; RMSEA = Root Mean Square Error of Approximation; LL = lower limit; UL = upper limit; CI = confidence interval.

[a] with correlation between items 9 and 6, 9 and 5, 9 and 7, and items 4 and 3.



(A) (B) (C)

Figure 1. Confirmatory factor analysis factor loadings (with WLSMV estimator) for the measures (A) teachers' use of feedback; (B) students' school identification; (C) students' behavioural engagement; fe_eff = Effective Feedback; fe_n_eff = Non-Effective Feedback; int_val = Intrinsic Value; pra_val = Practical Value; bel-wel = Belonging and Well-being; eng_aw = Academic Work Engagement; eng_cp = Class Participation.

Table 2

Fit Indices for Invariance Test for the Measure Models

Instrument	Invariance Model	X^2	*df*	*p*	CFI	RMSEA	ΔX^{2a}	*df*	*p*	ΔCFI	ΔRMSEA
Teachers' feedback	Configural for school year	667.71	215	<.001	.974	.065					
n_{6th} = 511; n_{7th} = 339;	Thresholds for school year	724.71	259	<.001	.973	.060	62.65	44	.034	-.001	-.005
n_{9th} = 709; n_{10th} = 616;	Factor loadings for school year	736.19	295	<.001	.974	.054	64.25	36	.003	.001	-.006
n_{12th} = 346;	Configural for course	309.19	86	<.001	.969	.073					
$n_{S\&H}$ = 666;	Thresholds for course	314.45	97	<.001	.970	.068	10.75	11	.464	.001	-.005
$n_{profissional}$ = 296	Factor loadings for course	395.10	106	<.001	.974	.061	3.18	9	.957	.004	-.007
School identification	Configural for school year	493.94	140	<.001	.968	.071					
n_{6th} = 514; n_{7th} = 343;	Thresholds for school year	555.69	180	<.001	.966	.064	46.91	40	.210	-.002	-.007
n_{9th} = 714; n_{10th} = 616;	Factor loadings for school year	569.14	208	<.001	.967	.059	63.44	28	.001	.001	-.005
n_{12th} = 346;	Configural for course	188.56	56	<.001	.974	.070					
$n_{S\&H}$ = 666;	Thresholds for course	199.32	66	<.001	.974	.065	4.28	10	.934	.000	-.005
$n_{profissional}$ = 296	Factor loadings for course	210.85	73	<.001	.973	.063	21.06	7	.004	-.001	-.002

Instrument	Invariance Model	X^2	*df*	*p*	CFI	RMSEA	ΔX^{2a}	*df*	*p*	ΔCFI	ΔRMSEA
Behavioral engagement	Configural for school year	357.67	129	<.001	.980	.059					
n_{6th} = 512; n_{7th} = 340;	Thresholds for school year	393.32	165	<.001	.980	.052	40.05	36	.295	.000	-.007
n_{9th} = 707; n_{10th} = 615;	Factor loadings for school year	445.16	193	<.001	.978	.051	67.85	28	<.001	-.002	-.001
n_{12th} = 346;	Configural for course	138.86	50	<.001	.979	.061					
$n_{S\&H}$ = 665;	Thresholds for course	149.46	59	<.001	.980	.055	7.83	9	.551	.001	-.006
$n_{profissional}$ = 296	Factor loadings for course	166.49	66	<.001	.976	.056	22.37	7	.002	-.004	.001

Note. Confirmatory Factor Analysis with WLSMV Estimator. CFI = comparative fit index; TLI = Tuker-Lewis index; RMSEA = Root Mean Square Error of Approximation.

[a] The chi-square value for WLSMV cannot be used for chi-square difference testing in the conventional way as described on the Mplus website. WLSMV difference testing was done using the DIFFTEST option, as suggested by Svetina et al., 2020.

Theoretical Model

Using plausible values of the factors assessed by our measures, next step was to test our theoretical model. The standardized estimated results are presented in Figure 2. The model presented an excellent fit in our sample – $\chi^2(11) = 66.32$, CFI = .989; TLI = .979; RMSEA = .045. We confirm a significative relation between students' perceptions about their teachers' use of effective feedback and students' behavioral engagement – $b = .231$, $\beta = .434$, $p < .001$ – and school identification – $b = .231$, $\beta = .469$, $p < .001$. We also confirm a small indirect relationship between feedback and engagement through school identification – $b = .103$, $\beta = .143$, $p < .001$. Together, teacher's feedback and school identification explain 40.7% of students' behavioural engagement, and teachers' feedback explain 22% of school identification.

Moderation Effect of School Year

The results from the invariance analysis of the theoretical model are presented in Table 3. Configural and metric invariance were held (only small changes of CFI and RMSEA were observed) but there were indications of non-invariance at the intercept level (ΔCFI < -.01 and ΔRMSEA > .01). The examination of the MIs in the Mplus output showed that there were four MIs with higher levels of critical values, namely the intercepts of the Intrinsic Value scale for 6th, 7th and 12th-year groups, and the intercept of the Effective Feedback for the 12th-year group. Following Dimitrov (2010), the model was modified by freeing one of the intercepts at a time, starting with the one with the most significant MI. After releasing these intercepts, the fit indices improved, and partial-invariance was held. We can conclude that all intercepts were invariant except for the four indicators mentioned. Observing the estimated values of the free intercepts, we found that students in the 12th year perceived that their teachers use less effective feedback (intercept was -0.231, while for all other years were 0.819). Still, that decrease of effective feedback is not related to a reduction of levels of their

general perception of their teachers' feedback. Results also indicated that 12th-year students perceived higher levels of Intrinsic Value (intercept = 0.512) than the students in 9th and 10th year (intercept = 0.371). In contrast, students in 6th (intercept = 0.204) and 7th year (intercept = 0.231) presented the lowest levels. Yet, this increase or decrease of Intrinsic value was not related to an increase or decrease of School Identification in these groups.

Using our partial-invariance model, we continued our analyse by testing for invariance at the structural path. Results present in Table 3 indicated that school year was not a moderator of the relation between teachers' feedback, students' engagement and school identification. The connection between the variables were the same in all groups.

Latent Means Differences by School Year

Once the means of the three factors of the model – teachers' Feedback, students Behavioural Engagement, and students School identification – were constrained to zero across all groups, model fit indices get significantly worse (CFI decrease .068 and RMSEA increase .049). This result indicates that there were differences in the means between the groups. The examination of the MIs showed that there were at least six indicators with higher levels of critical values that if they were allowed to be freely estimated, result in a partial-invariant model. The means of the parameters of these model with partial-invariance suggest that students of 6th (estimate = 1.023, p <.001) and 7th year (estimate = 0.819, p < .001) indicated that their teachers used more effective feedback than students from the 9th, 10th, and 12th year (estimates fixed to zero). School identification means were also higher in the 6th (estimate = 0.288, p <.001) and 7th year (estimate = 0.201, p < .001) than in the 9th and 10th year (estimates fixed to zero). The 12th year students' values of school identification were the lowest of all groups (estimates = -0.227, p < .001). Finally, 7th-year students presented a higher latent mean on behavioural engagement (estimates = 0.176, p = .002) than all other groups (fixed to zero).

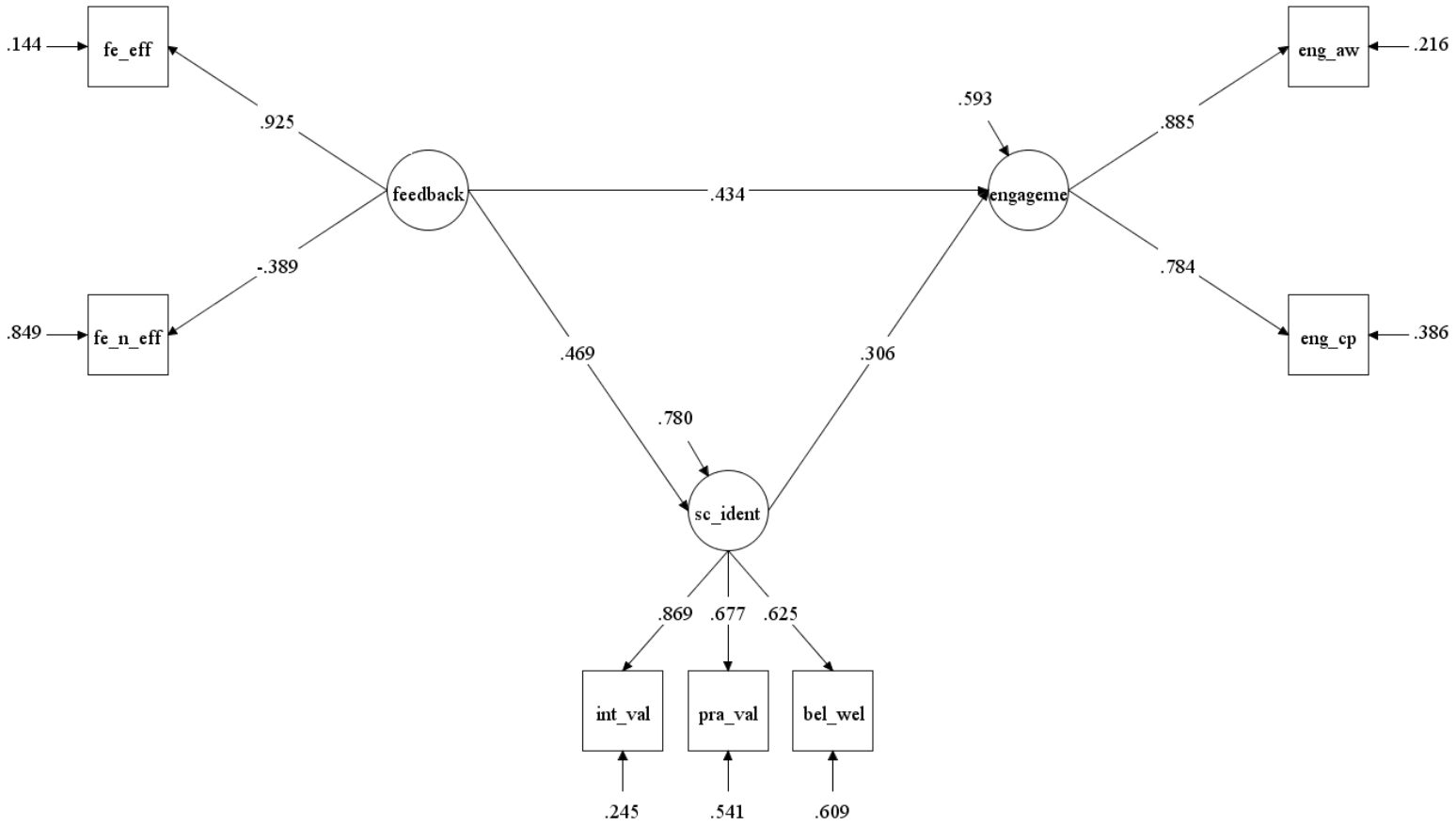


Figure 2. Equation Structural Model (with MLR estimator) for the relation between teachers' use of feedback, students' behavioural engagement, and students' school identification. Sc_ident = School Identification; fe_eff = Effective Feedback; fe_n_eff = Non-Effective Feedback; eng_aw = Academic Work Engagement; eng_cp = Class Participation; int_val = Intrinsic Value; pra_val = Practical Value; bel-wel = Belonging and Well-being.

Table 3

Fit Indices for Invariance Test for the Theorical Model

Instrument	Invariance Model	X^2	*df*	*p*	CFI	RMSEA	$\Delta X^{2\,f}$	*Df*	*p*	ΔCFI	ΔRMSEA
School year	Configural	99.64	60	.001	.991	.036					
invariance	Loading	107.87	76	.009	.993	.029	7.00	16	.020	.002	-.007
n_{6th} = 514;	Intercepts	205.89	92	<.001	.975	.049	97.48	16	<.001	-.018	.020
n_{7th} = 344;	Intercepts – Partial-invariance [a]	140.31	88	<.001	.989	.034	31.78	12	<.001	-.004	.005
n_{9th} = 714;	Structural path [a]	140.15	100	.002	.990	.030	5.09	12	.035	.001	-.006
n_{10th} = 615;	Factor means (constrained to zero) [a]	470.15	112	<.001	.922	.079	307.59	12	<.001	-.068	.049
n_{12th} = 346	Factor means (constrained to zero) – Partial-invariance [a,b]	170.96	106	<.001	.986	.035	24,68	6	<.001	-.004	.005
Course	Configural	59.33	24	<.001	.976	.055					
$n_{S\&H}$ = 665;	Factor loadings	72.55	28	<.001	.970	.058	10.38	4	.014	-.006	.003
$n_{profissional}$ = 296	Intercepts	109.37	32	<.001	.948	.071	34.96	4	<.001	-.022	.013
	Intercepts – Partial-invariance [c]	87.44	31	<.001	.962	.062	14.35	3	.001	-.008	.004
	Structural path [c]	107.01	34	<.001	.951	.067	15.58	3	<.001	-.011	.005

Instrument	Invariance Model	X^2	*df*	*p*	CFI	RMSEA	$\Delta X^{2\,f}$	*Df*	*p*	ΔCFI	ΔRMSEA
	Structural path – Partial-invariance [c,d]	93.55	33	<.001	.960	.062	5.33	2	.035	-.002	.000
	Means (constrained to zero) [c,d]	143.87	36	<.001	.928	.079	47,48	3	<.001	-.032	.17
	Means (constrained to zero) – partial-invariance [c,d,e]	93.92	.35	<.001	.961	.059	0.34	2	.422	.001	-.003

Note. Equation Structural Model with MLR Estimator. CFI = comparative fit index; TLI = Tuker-Lewis index; RMSEA = Root Mean Square Error of Approximation.

[a] Intercepts of the Intrinsic Value scale for 6th, 7th and 12th-year groups, and the intercept of the Effective Feedback for 12th-year group estimated freely; [b] Means of Feedback for 6th and 7th-year group and School identification for 6th, 7th and 12th-year group estimated freely; [c] Intercept of the Effective Feedback for the group of students in the professional course estimated freely; [d] the relation between teachers' use of feedback and students' school identification; [e] Means of Feedback for the S&H course group estimated freely; [f] The chi-square value for MLR cannot be used for chi-square difference testing in the conventional way as described on the Mplus website. MLR difference testing was done using the Satorra and Bentler (2010) chi-square testing.

Moderation Effects of Secondary Course

The results from the invariance analysis of the theoretical model for the Secondary Course are also presented in Table 3. Configural and metric invariance were held (only small changes of CFI and RMSEA were observed) but there were indications of non-invariance at the intercept level (ΔCFI < -.01 and ΔRMSEA > .01). The examination of the MIs in the Mplus output showed one MI with higher levels of critical values: the intercept of the Effective Feedback for the group of students in the professional course. After freeing this intercept, the fit indices improve and partial-invariance was held, indicating that the model was invariant across the groups at the intercept level, except for the indicator mentioned. The estimated values of the intercepts indicated that students in the professional course perceived that their teachers use more effective feedback (intercept estimate was .947, while for the S&H courses was -.341). Still, that increase of effective feedback is not related to an increase of levels of their general perception of their teachers' use of useful feedback.

Continuing with the testing for invariance at the level of the structural path, we confirm that the type of secondary course is a moderator of the relation between teachers' feedback, students' engagement and school identification (CFI decrease more than -.01). The non-invariance was related to the relation between teachers' use of feedback and students' school identification. The relation between these two variables was stronger in the students of the professional courses (b = 0.281, β = .587, p < .001) than for students of the S&H courses (b = 0.143, β = .289, p < .001).

Latent Means Differences by Secondary Course

Using the partial-invariance model identified in previous steps, we observed that, when means were constrained all to zero, there was a significant decrease in the CFI values and an increase of the RMSEA values. These results indicated there were significant differences between the latent means between the group of students in S&H courses and the

group of students in professional courses. MIs values indicate that theses difference was between the means of feedback of the S&H course group, which was significantly higher (estimates = 1.462, p <.001) compared to the means of the professional course group (fixed to zero). No other differences were observed.

Discussion

This study aimed to explore the relation between students' perceptions about Portuguese teachers' feedback and students' identification with the school, as well as investigate if this link could explain students' behavioural engagement. Our results confirm that there was a significant relationship between students' perception of teachers' use of feedback and their identification with school, answering our first research question. This relationship had a moderate size effect, with students' perceptions of teachers' feedback explaining 22% of the variability of school identification. Our results provided a critical contribution to the theory of school identification since it is the first time, to our knowledge, that this relationship had been studied. The more teachers' use of effective feedback, the higher was the students' sense of identification with the school, which can facilitate academic success (Voelkl, 2012).

Our results also supported our hypothesis that the more students' felt that teachers' use effective feedback, the more their engagement with school activities, and this relation was mediated by their feelings of identification with the school (research question two). These findings are consistent with previous research showing that giving to students clear and focused feedback on how they can improve their learning have a high potential to increase students' engagement in school activities (Jelas et al., 2016; Price et al., 2011; Wang & Wang, 2020). Our results provided some shreds of evidence for the validation of Voelkl (2012) theoretical model about the mediation effects of school identification between the contextual facilitating conditions and students behavioural engagement.

No moderating effects of the school year on the observed relationships were confirmed (research question three). These findings are opposite with previous work that shows that older students were less dependent on the valence of the feedback as compared to younger students (Jonsson & Panadero, 2018; Klem & Connell, 2004). However, results related to our fourth research question indicated that there were some differences in the dimension "teachers' use of Effective Feedback" and also gaps between students in the higher-order factor "teachers' use of Feedback". Students in the early years (6th and 7th) indicated that their teachers used more effective feedback than in older years (9th, 10th and 12th year).

Because there was a moderate relation between teachers' use of feedback and school identification, and because this relation was similar in all years of schooling, the same differences observed in the students' perception of teachers' use of feedback were reflected at the level of school identification. Students in the first years (6th and 7th) presented higher levels of identification with the school, while the lowest value was found in the group of 12th-year students. These results seem to be opposites to the ones we expected according to Voelkl (2012) theory. It was expected that students increase of years of schooling their sense of belongingness and the value they attribute to school and academic performance. The only dimension that presents a higher level in the later years of schooling was Intrinsic Value. It seems that students sense of self-competence and their intrinsic value as students increase with the years of education, but not their sense of belongingness or the practical value they gave to the school. These results may be related to the specific context of Portugal. Several studies in Portugal revealed that, in the later years of schooling (9th, 10th or 12th grades), students tend to value less the academic task and learning goals (Paulino, Sá, & da Silva, 2015; Miranda, Almeida, & Lozano, 2011). They also reveal more negative attitudes toward some academic domains like mathematic (Mata, Monteiro, & Peixoto, 2012; Monteiro,

Peixoto, Mata, & Sanches, 2017). Our results offered indicators that older students had fewer positive experiences with their teachers' feedback that may trigger disappointment, reducing their school identification.

The type of secondary course in which the students were enrolled did have a moderation effect in the relation between feedback and school identification. For students in the professional track, this relation was stronger (with a moderate size effect), than for the students in the S&H courses (with only a small size effect). The difference in the relation between these variables could explain why even though students in the S&H courses presented higher levels of teachers' use of feedback, they did not show higher levels of school identification. For the students in the S&H courses, teachers' feedback was not so relevant for their identification. But for the students that were oriented to a professional track, maybe the establishment of pedagogical relationships with teachers that use more effective feedback features a "reconciliation" with the schooling world, after a period of disidentification with school, as Alves and colleagues (2014) suggested.

Altogether, these results provide evidence for the potential of teachers' feedback to foster students' school identification and behavioural engagement. Educators who openly discuss teaching and learning with students and invite them to provide critical feedback on instruction, tasks and assessments use students as a resource to change their classroom practice and classroom climate (Boud & Molly, 2013). In other words, they try to improve their teaching by promoting an active student, not just the receiver of inputs from others. We need to change the learning environments because our results indicated a decrease in the use of excellent and useful feedback. As Boud and Molly (2013) said, these environments are not ready, they need to be constructed, not only by a teacher, but by all the community, including the students.

However, the current study had some limitations, specifically we cannot infer causal relationships between the variables because of the cross-sectional nature of the design used. Additionally, only students report was used to assess the use of teachers' feedback and not teachers' actual feedback. Therefore, we cannot say that teachers use of effective feedback influence student's school identification and behavioural engagement, although we cannot rule out that the variables are closely related. Future studies should use multiple assessments over time, incorporate classroom observations and teacher-reports to provide a clearer view of the causal relations between variables and their changes in time. Furthermore, more investigation should be done regarding how learners' individual and situational features (e.g., ethnic background, gender) may relate or affect their feedback perceptions, as well as how these perceptions relate to learning.

Despite these limitations, this work extends previous research, by highlighting the importance of teachers' effective feedback on students' life in school, specifically, their engagement and identification with school. Overall, this research illustrated that teachers' feedback can be used as a tool to promote students' engagement and identification in the school context.

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