



# The moderating influence of perceived competence in learning on mentored students' school performance



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## ABSTRACT

Our aim is to examine whether mentored students' Perceived Competence in Learning (PCL) moderates school performance outcomes in school-based mentoring (SBM) programs delivered by teachers. A three-stage longitudinal study was conducted in order to compare mentored ( $n = 157$ ) and non-mentored students ( $n = 160$ ) enrolled in formal basic education (5th to 8th grades). Multivariate Analyses of Covariance (MANCOVA) revealed that mentoring was moderately effective in improving mentees' Portuguese grades and Grade Point Average (GPA) and reducing the number of unexcused absences compared to equivalent non-mentored students. The study also demonstrated that the mentees' PCL had a significant moderating effect on improvement in their Math grades. The different patterns of change in PCL during SBM also contributed to a variation in school performance outcomes. These results suggest that SBM delivered by experienced educators may enhance PCL as well as school performance in formal learning contexts.

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## 1. Introduction

School-based mentoring (SBM) is an educational process in which an adult (the mentor) helps one or more students (the mentees) to fulfill their academic or nonacademic goals (Nuñez, Rosário, Vallejo, & González-Pienda, 2013). Some SBM programs involve supporting mentored students to develop their needs of competence, relatedness and autonomy (blind for review), but most of them tend to focus on school performance issues (DuBois, Portillo, Rhodes, Silverthorn, & Valentine, 2011).

The impact of SBM is variable. Some meta-analyses found that SBM impact ranged from un-existent (Wood & Mayo-Wilson, 2012) to modest, but significant (DuBois et al., 2011). There is accumulated evidence that SBM effectiveness is influenced by a wide array of factors such as: the mentees' gender (Darling, Bogat, Cavell, Murphy, & Sanchez, 2006) or level of relational risk (Schwartz, Rhodes, Chan, & Herrera, 2011); the mentor's profile, including his/her background in caring and educational roles (DuBois et al., 2011); or the specific implementation of the SBM program (DuBois et al., 2011), such as the existence of appropriate activities (Karcher, 2008) or the duration of SBM relationships (Grossman, Chan, Schwartz, & Rhodes, 2012).

In the mentoring research field mentees' motivational characteristics have mostly been examined as a product of SBM (e.g. Herrera, Grossman, Kauh, & McMaken, 2011) rather than a process that may

influence the effectiveness of SBM itself. The context for our research is the requirement, emerging from basic research, for new approaches that will elucidate the relationship between students' academic self-perceptions and specific educational interventions, such as SBM, and how this determines academic results (Schunk & Pajares, 2005; Wigfield & Eccles, 2002). Understanding this interaction is of greater importance in the case of the most vulnerable students. Frequently, vulnerable students have not mastered basic academic skills and this negatively influences their perceptions of competence in learning (Schüler, Sheldon, & Fröhlich, 2009; Schunk & Pajares, 2005). Given that SBM is provided to vulnerable students with the intention of compensating for their previous academic deficits/failures (DuBois et al., 2011), our overriding objective is to understand the role of perceived competence in learning (PCL) on mentees' school performance when SBM is delivered by teachers.

### 1.1. PCL and school performance

PCL is generally defined as the current perceived level of skill (Kaplan & Midgley, 1997). It is commonly considered as the motivational dimension of self-regulated learning, which also includes metacognition and strategic planning (Boekaerts & Corno, 2005; Wolters, 2003). Some authors (e.g. Friedrich, Jonkmann, Nagengast, Schmitz, & Trautwein, 2013) view PCL as part of the self-concept, owing to its subjective nature. However, there is no consensus definition of perceived competence. Most of the theoretical controversy stems from conceptual similarities between perceived competence, self-efficacy beliefs and outcome expectations. Although all of these notions enable

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the measurement of competence perceptions, there are some important differences between them.

Perceived competence and self-efficacy beliefs are perceptions about one's ability to perform with success (Schunk & Pajares, 2005). However, perceived competence has been defined as a general self-perception of competence across different fields or tasks, while self-efficacy beliefs are subjective perspectives about personal competence in a specific domain (Ryan & Deci, 2009). Furthermore, while the measurement of perceived competence may involve self–other comparisons (for instance between a student and his/her peers), the examination of self-efficacy does not usually integrate social comparisons in horizontal relationships (Schunk & Pajares, 2002). Moreover, perceived competence and self-efficacy beliefs are both distinct from outcome expectations. Perceived competence and self-efficacy beliefs may help to determine the outcomes an individual expects (Schunk & Pajares, 2005), but outcome expectations are judgments about the likely consequences of a certain behavior (Bandura, 1977).

A positive PCL has been associated with better academic results (Obach, 2003) even after controlling for previous school performance (Schunk & Pajares, 2005). More positive PCL tends to have a stronger positive influence on Math grades than on other subjects (Kaplan & Midgley, 1997; Schunk & Pajares, 2005). Improvement in PCL also acts as a mediator between more complex strategies of self-regulated learning and better school grades (Schunk & Pajares, 2005). Conversely, lower PCL mediates between lower psychological involvement in school and lower school grades (Stephan, Caudroit, Boiché, & Sarrazin, 2011).

The quality, intensity and accuracy of students' PCL are determined by multiple factors. Female students (Obach, 2003; Wigfield & Eccles, 2002; Zisimopoulos & Galanaki, 2009) and younger students (Guillet, Vallerand, & Lefrenière, 2012; Wigfield & Eccles, 2002) who have more positive academic experiences (Schüler et al., 2009; Schunk & Pajares, 2005), tend to report a more positive perception of their learning skills. Higher levels of interest in a certain task (Ryan & Deci, 2009), providing opportunities to choose learning materials and activities (Ryan & Deci, 2009) and greater salience of mastery goals rather than performance goals (Kaplan & Midgley, 1997) seem to lead to more positive PCL as well. In addition, vicarious experiences (Bandura, 1977), social comparisons and social persuasion (Schunk & Pajares, 2005) also affect the development of PCL.

### 1.2. SBM and PCL

A number of studies have analyzed the impact of SBM on mentees' PCL. Herrera et al. (2011) found that after being mentored for one school year mentored students had more positive perceptions of their academic skills than an equivalent control group. Nuñez et al. (2013) demonstrated that SBM contributes to an improvement in mentees' perceived self-efficacy. In addition, Zand et al. (2009) reported that mentees who have more positive perceptions of their own competence also have more favorable opinions about their mentoring relationship.

Although and improvement of PCL may be an important outcome of SBM, it is relevant to understand how mentoring and PCL may interact in order to influence school performance. In fact, mentoring is intended to provide care, structure, limits and feedback in a context in which the mentors and mentees continuously affect each other perceptions (DuBois et al., 2011). These characteristics transform SBM into a privileged relational context in which to tackle the negative or weak PCL of vulnerable students, which may ultimately result in positive school performance becoming integrated into the mentee's personal value set. Such a structural change in the case of mentored students' core beliefs may be more appropriately stimulated when mentors have a background in educational roles (DuBois et al., 2011, Simões & Alarcão, 2014). Such mentors can more easily adjust their strategies to the mentee's level of perceived competence (Friedrich et al., 2013) while focusing on school-related goals (Karcher, 2008). However as

mentoring interventions with objectives defined in terms of academic outcomes become increasingly widespread, agencies have continued to rely on volunteer mentors who lack the necessary expertise in educational roles, (DuBois et al., 2011).

### 1.3. The current study

Our aim was to investigate the potential influence of SBM on school achievement and mentored students' self-perceptions of their PCL, when SBM combines mentoring and teaching roles. In this study we sought answers for the following three questions: (a) do SBM and PCL have independent effects on mentored students' school performance? (b) is there an interaction between SBM and PCL that affects the mentees' school performance? and (c) do different patterns of evolution of PCL during delivery of SBM have a distinct influence on school performance?

We focused on the influence of PCL on school performance indicators for three main reasons. Firstly, the effect of PCL on academic performance in educational interventions is often undetected as it is integrated into general measures of self-regulation of learning (Wolters, 2003). Secondly, the use of a general indicator of individuals' perceptions of learning competence may help to counteract the previously reported deterioration of perceived self-efficacy in school performance during early adolescence (Wigfield & Eccles, 2002). Thirdly, the PCL construct has been developed in the context of the Self-Determination Theory, which is the main theoretical inspiration for the mentoring program we investigated, *Metodologia TUTAL*.

*Metodologia TUTAL* is a Portuguese SBM program developed by public and private organizations under a grant from the European Social Fund (EQUAL Communitarian Initiative). The program defines SBM as the support and orientation offered by an experienced adult (the mentor) to children/adolescents (the mentees), through the satisfaction of their basic psychological needs (Ryan & Deci, 2009).

The mentees are students referred to the program by the school boards because of low school attendance rates, an indication for supplementary classes, disciplinary problems and/or underachievement. The mentors are teachers who volunteer to mentor their own students, as long as they meet two criteria: (a) they must have had some experience in informal mentoring; and (b) preferably, they should be members of the permanent staff of their respective school.

The mentors are enrolled in a 16-hour training program prior to the beginning of the official school year. The training includes: (a) basic information about SBM and the *Metodologia TUTAL*; (b) practicing communication and motivational skills to enable the satisfaction of the mentees' basic psychological needs; and (c) preparing activities in the context of group and one-on-one mentoring sessions. Ongoing supervision of the program includes monthly meetings and informal contact by phone and e-mail with a coordinator from a non-governmental organization responsible for the program.

The mentoring lasts approximately 9 months. Ninety-minute weekly group mentoring sessions delivered by the mentors start at the beginning of the school year; the sessions focus on the schoolwork orientation of the mentees and promote their social integration. The group mentoring sessions precede one-on-one sessions to facilitate mentor–mentee matching. One month later, the mentees and mentors start exploratory one-on-one discussions on their goals for the mentoring relationship. Dyadic mentoring relationships are established two weeks later, according to mutual objectives and interests. Weekly one-on-one SBM meetings occur during the school day and last an average of 30 minutes. The meetings do not involve removing the mentees from their classes. Mentors are taught the importance of delivering balanced support to the different basic psychological needs. However, they are intentionally given the opportunity to regulate the amount of the support given to the mentees during SBM sessions.

## 2. Method

### 2.1. Participants

The participants in this study were students enrolled in six schools of the Portuguese public educational system that implemented the *Metodologia TUTAL*. Five hundred and fifty-one potential participants were integrated into 27 classes assigned to the study by their respective school boards. The classes were randomly assigned to either the mentored or the non-mentored group. We used simple random distribution in order to assign the classes evenly for each of the preexisting conditions (Schulz & Grimes, 2002). Most of the students met at least one of the four inclusion criteria: recommendation for supplementary classes, grade retentions, absenteeism or a record of disciplinary referrals. From the 551 potential participants, 53 did not meet at least one of the criteria and were excluded from the study. A total of 181 students either did not complete the surveys or did not receive authorization from their legal representatives to participate in the research. The final sample included 317 students, representing a participation rate of 63.7%.

Of the total 317 participants, 157 (49.5%) were mentored students ( $M = 12.75$ ,  $SD = 1.75$ ) while the non-mentored group comprised 160 students (50.5%) ( $M = 12.06$ ,  $SD = 1.81$ ). Table 1 depicts the demographic variables and inclusion criteria for mentored and non-mentored students.

### 2.2. Design

The study design included three assessment points. The first assessment (Time Point 1) was made before the end of the school year preceding implementation of the SBM program. The second assessment (Time Point 2) was made in the following school year, two months after the start of the SBM program. The third assessment (Time Point 3) was made six months later, after completion of the SBM program. We used multivariate statistical techniques to analyze the data because research in the SBM field rarely enables longitudinal comparisons between different groups (Nuñez et al., 2013).

### 2.3. Measures

#### 2.3.1. SBM

The participants were characterized according to whether they were being mentored or not (0 = Yes; 1 = No).

#### 2.3.2. PCL

We measured PCL using the Portuguese version of the Perceived Competence in Learning Scale (PCLS) (Williams, Friedman, & Deci, 1998). This scale assesses subjective competence related to learning in general (e.g. I am capable of learning in most of the subjects I attend). The PCLS comprises four items that are rated using a 5-point scale ranging from 1 (*Never*) to 5 (*Always*). Possible total scores range from 5 to 20 points. Higher scores denote more positive perceptions of learning

competence. The internal consistency of the PCLS was adequate at both Time Points 2 ( $\alpha = .78$ ) and 3 ( $\alpha = .81$ ).

#### 2.3.3. Dependent measures

We characterized Portuguese language and Math grades as indicators of school performance because grade promotion in the Portuguese basic education system depends on having positive classifications in at least one of these subjects. We also included the GPA in order to have an indicator that could reflect the general academic performance of the participants. The Portuguese basic education system classifies the following grades as 1 and 2 (negative), 3 (fair), 4 (good) and 5 (excellent). We checked Portuguese language and Math grades for each of the participants at each evaluation time point. In addition, we calculated the GPA for each of the participants. The GPA at each of the evaluation time points corresponded to the sum of all the grades, ranging from 1 to 5, divided by the total number of subjects attended by each participant.

The total numbers of discipline referrals and unexcused absences registered in the students' school record were counted. The numbers of disciplinary referrals and of unexcused absences were assessed only for time points 1 and 3. This option was made because disciplinary referrals and unexcused absences numbers for each student are rechecked and definite only by the end of each school year. Table 2 includes the descriptive statistics for the independent and dependent measures.

### 2.4. Procedures

Information regarding the criteria of inclusion in the study was gathered from each of the participants' school files. Before the data were collected, informed consent was obtained from the legal representatives of the students. Information about the targeted variables was gathered through an examination of the personal file of each participant. The PCL measures were collected by group surveys 2 months after the school year began (Time Point 2) and 6 months later (Time Point 3) during citizenship classes. We obtained the participants' verbal assent to participate in the research; teachers were not present when data were collected.

### 2.5. Data analyses

Data analyses were conducted using the Statistical Package for Social Sciences (SPSS) v. 19.0. The missing data were random and limited (<2.2%) and were, therefore, handled with a simple group mean substitution. In general, the dependent variables assessed were moderately correlated with each other for each of the samples, as depicted in Tables 3 and 4. The normality of the variables was verified through the Kolmogorov–Smirnov test, with the Lilliefors correction, while the homogeneity of the variances was screened using the Levene test. The equivalence between mentored and non-mentored students regarding demographics and the criteria of inclusion in the study was examined using t-tests and chi-square tests.

Two Multivariate Analysis of Covariance (MANCOVA) models including follow-up Analysis of Covariance (ANCOVA) were conducted

**Table 1**  
Mentored and non-mentored students by gender, educational level and criteria of inclusion in the study.

	Mentored students ( $n = 157$ )	Non-mentored students ( $n = 160$ )
Gender – M (F)	67 (90)	69 (91)
Educational level – second level (third level)	64 (93)	30 (69)
Criteria of inclusion in the study		
Supplementary classes	131 (83.4%)	125 (78.6%)
Prior retentions	126 (80.3%)	85 (53.1%)
Absenteeism	115 (73.2%)	116 (72.5%)
Disciplinary record	47 (30.5%)	29 (20.4%)

**Table 2**  
Mentored and non-mentored students descriptive statistics for the perceived competence in learning measure and the dependent measures.

Variables	Mentored students		Non-mentored students	
	SD	M	M	SD
PCL (Time 2)	15.14	3.04	15.66	2.84
PCL (Time 3)	15.61	2.55	14.84	2.71
Portuguese grade (Time 1)	2.74	.67	2.84	.63
Portuguese grade (Time 2)	2.91	.54	2.74	.54
Portuguese grade (Time 3)	2.95	.57	2.83	.49
Math grade (Time 1)	2.65	.64	2.69	.60
Math grade (Time 2)	2.79	.59	2.63	.67
Math grade (Time 3)	2.91	.59	2.80	.68
GPA (Time 1)	3.05	.52	3.19	.50
GPA (Time 2)	3.05	.36	2.94	.39
GPA (Time 3)	3.19	.37	3.05	.36
Disciplinary referrals (Time 1)	1.95	8.13	2.54	9.42
Disciplinary referrals (Time 3)	.79	2.66	1.12	5.18
Unexcused absences (Time 1)	13.11	14.56	11.11	14.38
Unexcused absences (Time 3)	12.69	13.36	16.07	14.94

to test our first two research questions. The first MANCOVA included the number of unexcused absences and disciplinary referrals for time point 1 and time point 3 as within-subject variables, being mentored or not, as well as PCL rates (time point 3) as between-subject factors, with age, prior retention and PCL rates (time point 2) as covariates. The second MANCOVA model was similarly set; however, Portuguese language grade, Math grade and GPA for all the assessment points were included as within-subject variables.

A similar MANCOVA and the respective follow-up ANCOVAs were performed to assess our third research question. However, a new factor was introduced to calculate the group differences between Time Points 2 and 3 in terms of the levels of PCL. This factor was divided into four levels regarding the evolution of the participants' between assessment points 2 and 3: mentees with an increased level of PCL; mentees with a lower or unchanged level PCL; non-mentored students with an increased level of PCL; non-mentored students with a lower or unchanged level of PCL. Finally, age and prior retentions were included in the model as covariates. This additional MANCOVA included post-hoc tests for multiple comparisons of the observed means using Fisher's Least Significant Difference test. The effect sizes ( $\eta^2$ ) were calculated for all MANCOVAs. The level of significance for the statistical tests was set at  $p < .05$ .

### 3. Results

The study of the equivalence between mentored and non-mentored groups revealed that the mentored students were significantly older

**Table 4**  
Correlation analysis for disciplinary referrals, and unexcused absences (time points 1 and 3).

Variables	Correlations			
	1	2	3	4
1.Disciplinary referrals (Time 1)				
2.Disciplinary referrals (Time 3)	.59**			
3.Unexcused absences (Time 1)	.32**	.15**		
4.Unexcused absences (Time 3)	.23**	.13*	.61**	

\* $p < .05$ , \*\* $p < .01$ .

than the non-mentored students,  $t(1, 316) = 3.13, p = .002$ , and had a greater chance of being previously retained,  $\chi^2(1, 316) = 26.21, p = .000$ .

A significant MANCOVA was found for the independent effect of the type of group on the participants' numbers of disciplinary referrals and unexcused absences,  $F(1, 316) = 4.68, p = .01, \eta^2 = .04$ . The following ANCOVAs revealed that the mentored students had a significantly lower number of unexcused absences,  $F(1, 316) = 3.07, p = .04, \eta^2 = .02$ . Conversely, significant results for both the effects of PCL and the interaction of the type of group with the PCL were not found for the participants' numbers of disciplinary referrals and unexcused absences.

A significant MANCOVA was also obtained for the independent effect of the type of group on the participants' grades,  $F(1, 316) = 2.62, p = .04, \eta^2 = .06$ . Follow-up ANCOVAs depicted marginally significant differences between mentored and non-mentored students regarding Portuguese grade,  $F(1, 316) = 3.82, p = .05, \eta^2 = .01$ , and GPA,  $F(1, 316) = 3.75, p = .05, \eta^2 = .01$ , from Time Point 1 to Time Point 3. The independent effect of PCL was statistically significant,  $F(78, 825) = 1.23, p = .03, \eta^2 = .10$ . However, follow-up ANCOVAs did not show significant effects for any of the dependent variables included in the model. Finally, a statistically significant MANCOVA was obtained for the interaction between the type of group (mentored or non-mentored) and PCL regarding the participants' grades,  $F(72, 1650) = 1.44, p = .01, \eta^2 = .06$ . Follow-up ANCOVAs depicted significant differences between mentored and non-mentored students regarding Math grade,  $F(12, 305) = 1.27, p = .04, \eta^2 = .08$ .

According to Table 5, eighty-two (52.2%) of the mentees perceived an increase of PCL between assessment points 2 and 3 ( $M = 12.62, SD = 1.70$ ). Conversely, 75 (47.8%) of the mentees experienced lower or unchanged PCL between the second and third assessment points ( $M = 12.88, SD = 1.57$ ). Sixty-one (38.1%) of the non-mentored students showed an increment of PCL between the assessment points ( $M = 12.18, SD = 1.88$ ). Finally, 99 (61.9%) of the non-mentored students showed a decreased or unchanged PCL between the assessment points ( $M = 11.98, SD = 1.78$ ).

Significant MANCOVA effects were observed regarding the opposite levels of PCL (increased vs. decreased/unchanged) on participants' grades as well,  $F(3, 314) = 1.86, p = .04, \eta^2 = .02$ . The follow-

**Table 3**  
Correlation analysis for Portuguese grades, Math grades and GPA (Time Points 1, 2 and 3).

Variables	Correlations								
	1	2	3	4	5	6	7	8	9
1.Portuguese grade (Time 1)									
2.Portuguese grade (Time 2)	.11								
3.Portuguese grade (Time 3)	.07	.63**							
4.Math grade (Time 1)	.68**	.09	.11						
5.Math grade (Time 2)	.16**	.46**	.49**	.27**					
6.Math grade (Time 3)	.18**	.41**	.48**	.27**	.71**				
7.GPA (Time 1)	.81**	.09	.08	.72**	.15**	.20**			
8.GPA (Time 2)	.15**	.58**	.53**	.22**	.64**	.58**	.20**		
9.GPA (Time 3)	.12**	.48**	.66**	.22**	.54**	.66**	.20**	.74**	

\* $p < .05$ , \*\* $p < .01$ .

up ANCOVAs were statistically significant for Portuguese grade,  $F(3, 314) = 3.69, p = .01, \eta^2 = .03$ , Math grade,  $F(3, 314) = 2.94, p = .03, \eta^2 = .03$ , and marginally significant for GPA,  $F(3, 314) = 2.41, p = .07, \eta^2 = .02$ .

Subsequent post-hoc mean comparisons obtained from both MANCOVAs are presented in Table 6. Such comparisons reveal that the mentees who perceived improved levels of PCL exhibited significantly higher ratings between the first and third assessment points for Portuguese grade ( $p < .01$ ) and a marginally significant lower number of unexcused absences ( $p < .10$ ) than did the non-mentored students who also experienced better perspectives of PCL. Moreover, the mentees who perceived improved perceptions of PCL had marginally significantly higher Math grades ( $p < .10$ ) than non-mentored students who showed opposite levels of PCL. In addition, the mentees who showed improved perceptions of PCL denoted significantly higher Portuguese grades ( $p < .01$ ) than those mentees in the reverse condition. On their turn, the non-mentored students who denoted improved perspectives of PCL between the assessment points did not differ significantly from non-mentored students in the opposite condition of PCL.

The post-hoc mean comparisons also revealed that mentees who experienced lower or unchanged perspectives of PCL had significantly lower Portuguese grades ( $p < .01$ ), Math grades, ( $p < .01$ ) and GPA ( $p < .05$ ) and a significantly higher number of unexcused absences ( $p < .001$ ) between the first and third assessment points than non-mentored students in an identical condition of PCL. Finally, the mentored students with less or similar perceptions of PCL had significantly higher Portuguese grades ( $p < .01$ ) and GPA ( $p < .05$ ) and significantly lower mean number of unexcused absences ( $p < .05$ ) than the non-mentored students in the opposite condition.

#### 4. Discussion

In this study we investigated three issues. Firstly, we wanted to examine whether SBM and PCL had independent effects on mentored students' school performance. Secondly, we explored the interactive effect of SBM and PCL on mentees' school performance. Finally, we aimed to determine whether different levels of PCL differed in their influence on school performance. We used data from a Portuguese SBM program with an unusual combination of mentoring and teaching roles to explore these issues.

Our first main finding is that SBM delivered through *Metodologia TUTAL* was effective in improving the mentored students' school performance. By the end of the program, mentees' Portuguese grade, GPA and attendance rate were significantly better than those of matched non-mentored students. These findings add to previously published evidence that SBM programs improve mentees' school grades (Converse & Lingnugaris/Kraft, 2009; Herrera et al., 2011) and reduce the number of unexcused absences (Converse & Lingnugaris/Kraft, 2009). However,

not all studies have found a significant association between mentoring and higher school achievement (e.g. Karcher, 2008). Meta-analysis showed that SBM was only modestly effective in improving academic outcomes (DuBois et al., 2011).

In our opinion the effectiveness of the *Metodologia TUTAL* in improving school grades and attendance was partly due to the unusual use of teachers to deliver mentoring. These teacher mentors were perhaps more aware of their mentees' school requirements and may therefore have been better placed to help mentees to achieve their academic goals than the mentors in other SBM programs. In turn, a more consistent focus on mentees' academic competence needs may have influenced SBM activities. Previous research on *Metodologia TUTAL* demonstrated that the mentors and mentees often gathered to discuss and work on learning issues (Simões & Alarcão, submitted). This practice and the focus on activities related to school performance may have led mentors to being more involved in helping mentees to overcome previous learning deficits (Karcher & Nakkula, 2010).

Our second major finding was that changes in PCL during delivery of the program contributed to a marginally significant improvement in mentees' Math grades compared with non-mentored students. This finding replicated findings from other learning contexts that a more positive PCL has a stronger influence on grades in Math than other subjects (Kaplan & Midgley, 1997; Schunk & Pajares, 2005). Previous research demonstrated that students' self-concepts of mathematical and verbal skills are largely independent, although there is a correlation between academic outcomes in these areas (Marsh, 1986). Students tend to feel more pressure to perform well in Math; they also find Math-related tasks more demanding and less interesting than other subjects (Nicolaidou & Philippou, 2003). Remedial interventions based on social support from teachers, such as SBM, are more effective in improving achievement in Math than other subjects (Georgiou, Stavriniades, & Kalavana, 2007). This type of intervention may indirectly influence cognitive processes central to Math achievement such as attention and working memory. More importantly, they may offer an opportunity to change students' perception of others' perception about their ability in Math, which is one of the most important influences on self-perception of competence in Math (Nunes, Bryant, Sylva, & Barros, 2009). It should also be noted that correlations between general measures of competence, such as PCL, and broader measures of competence, such as GPA, are usually lower than correlations between PCL and specific subjects (Friedrich et al., 2013).

Our third main finding was that changes in PCL did not operate consistently across different subgroups of mentored and non-mentored students. For instance, mentees whose PCL increased showed improvements in Portuguese language when compared with matched non-mentored and mentored students whose PCL decreased or did not change. Mentees whose PCL increased during the program also had significantly fewer unexcused absences than non-mentored students whose PCL had increased. Conversely, mentees whose PCL decreased while they were involved in the program had significantly worse results on most of the indicators of school performance than matched non-mentored students; however even these mentored students had significantly better Portuguese grades, a higher GPA and fewer unexcused absences than the non-mentored students whose PCL had increased during the program. These inconsistencies may be due to a combination of reasons.

Firstly, because students' previous experiences in school and in different subject areas are important determinants of PCL (Guillet et al., 2012; Wigfield & Eccles, 2002) the fact that individual PCL was neither a criterion for selecting candidates for mentoring, nor for determining the type of activities undertaken during SBM sessions may have influenced our results.

Secondly, the most vulnerable students - those who have not mastered basic academic skills - are also more resistant to positive change in self-perceived competence (Schüler et al., 2009; Schunk & Pajares, 2005) and usually benefit less from SBM programs in terms of

**Table 5**

Subgroups of mentored and non-mentored students according to the evolution of PCL between time point 2 and time point 3: distribution by gender, educational level and criteria of inclusion in the study.

	1 (n = 82)	2 (n = 75)	3 (n = 61)	4 (n = 91)
Gender – M (F)	36 (46)	31 (44)	32 (37)	35 (53)
Educational level – second level (third level)	50 (32)	43 (32)	36 (25)	55 (41)
Criteria of inclusion in the study				
Supplementary classes	67 (85.3%)	64 (85.3%)	39 (63.9%)	37 (37.4%)
Prior retentions	20 (24.4%)	24 (32.0%)	31 (50.8%)	54 (54.5%)
Absenteeism	22 (26.8%)	20 (26.7%)	45 (73.8%)	28 (28.3%)
Disciplinary record	23 (28.0%)	24 (32.0%)	16 (26.2%)	13 (13.1%)

1. Mentored students (increased PCL); 2. mentored students (lower or unchanged PCL); 3. non-mentored students (increased PCL); and 4. non-mentored students (lower or unchanged PCL).

**Table 6**

Post-hoc comparisons of the conditions of increased, decreased or unchanged PCL of mentored students (MS) and non-mentored students (NMS) in terms of the dependent variables (Least Significant Difference [LSD] Test).

Dependent measures	Mean difference (95% confidence interval)					
	1	2	3	4	5	6
Portuguese grade	.21 (.07, .35)**	.08 (.04, .20)	.17 (.05, .28)**	.04 (−.09, .17)	−.17 (−.28, .05)**	.21 (.07, .34)**
Math grade	.01 (−.17, .18)	.12 (−.03, .27)†	−.10 (−.25, .16)	.12 (−.05, .28)	−.22 (−.36, −.07)**	.10 (−.08, .27)
GPA	.04 (−.07, .15)	−.07 (−.16, .03)	−.07 (−.16, .03)	−.01 (−.11, .09)	−.12 (−.21, −.03)*	.11 (.01, .22)*
Disciplinary referrals	−.69 (−.28, .14)	−.26 (−2.09, 1.56)	−.26 (−2.09, 1.56)	−.81 (−2.73, 1.22)	1.23 (.49, 2.95)	−.43 (−2.50, 1.65)
Unexcused absences	−2.98 (−6.38, −.39)†	.44 (−.25, 3.39)	.44 (−2.51, 3.39)	1.88 (−1.24, 4.99)	5.32 (2.54, 8.10)***	−3.44 (−6.79, −.09)*

† $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

1. MS (increased level of PCL) × NMS (increased level of PCL); 2. MS (increased level of PCL) × NMS (lower or unchanged levels of PCL); 3. MS (increased level of PCL) × MS (lower or unchanged level of PCL); 4. NMS (lower or unchanged level of PCL) × NMS (increased level of PCL); 5. NMS (lower or unchanged level of PCL) × MS (lower or unchanged level of PCL); 6. MS (lower or unchanged level of PCL) × NMS (increased level of PCL).

academic performance than their peers (Schwartz et al., 2011). For mentees who showed no change or a decrease in PCL during the mentoring program, SBM may have been perceived as a simple extension of teaching; something which, ultimately, failed to improve academic results.

Thirdly, mentors decided the distribution of support for mentees' various needs in *Metodologia TUTAL*. There is little doubt that a clear structure of academic goals is important to the instrumental effectiveness of SBM (Karcher, 2008), however it is likely that in order to help them to improve their school performance, mentees with more negative PCL needed a SBM relationship in which support was more evenly distributed between their relatedness and autonomy needs (Milyavskaya et al., 2009; Ryan & Deci, 2009).

Finally, while SBM may have played an important part in helping mentees to improve their PCL and in consequence their school performance, these same students continued to interact with other teachers in school during the program. In our study the role of other teachers in shaping the changes in mentored students' competence beliefs was certainly an additional influence on the outcomes.

#### 4.1. Implications, recommendations and limitations

From a practical standpoint, our findings suggest that agencies running SBM programs aimed at improving school performance should involve mentors who have experience in educational roles. Mentors with educational experience may be better prepared to facilitate improvements in mentees' PCL and to achieve mentoring goals related to school outcomes (DuBois et al., 2011). However this conclusion should be confirmed through further research comparing the effects of programs similar to *Metodologia TUTAL* with those of programs delivered by mentors who do not have educational experience.

Programs should consider formative assessment of mentees' PCL. This would help mentors to make continuous adjustments to the focus of SBM activities and relationship style (Friedrich et al., 2013). Regular assessment of mentees' PCL could also be used to inform training and supervision of mentors. Mentors could taught strategies for improving mentored students' PCL such as: (a) providing opportunities for the mentee to choose learning materials and activities; (b) providing learning situations that may enable the mentee to experience a sense of mastery; and (c) teaching the mentee to use self-evaluation techniques to identify systematically useful learning strategies (Nuñez et al., 2013).

From a research perspective, we consider that new research is needed to determine how other motivational dimensions such as persistence or effort in activities undertaken in SBM sessions, or interest in activities proposed by the mentor, predict mentored students' school performance (Schunk & Pajares, 2005). The examination of SBM sessions at this level of detail would help to extend previous findings which have consistently showed that the effectiveness of SBM depends on how meetings between mentors and mentees are structured (Karcher, 2008). In addition, it would be helpful to analyze the influence of PCL

in different types of SBM programs using more sophisticated statistical techniques (e.g. structural equation models) to explore in detail the influence of mentees' competence perspectives. This sort of analysis would be especially helpful in improving our understanding of the pattern of effects produced by changes in PCL in different subgroups of mentored and non-mentored students.

Our work has some limitations. Firstly, our measure of PCL did not include items enabling participants to compare themselves with their peers in terms of perceived competence. The study included 63% of the potential participants. This may have led to an overrepresentation of students who were willing to respond, which in turn may have resulted in polarization of responses such that extreme patterns assumed a disproportionate significance in the results. Unexcused absences and disciplinary referrals could only be assessed twice. Finally, subgroups of mentored and non-mentored students were not selected according to proportional random selection procedures that would have balanced the number of participants, but we controlled for significant differences between the groups in terms of age and prior retentions to reduce the impact of this feature of the selection process.

## 5. Conclusion

Our study is the first to demonstrate that PCL may moderate the effectiveness of SBM delivered by teachers in improving school performance, particularly in Math. Our findings also provide evidence that different patterns of change in PCL during an educational intervention produce different academic outcomes. Assessing mentees' PCL during mentoring to facilitate continuous adjustments in the organization of SBM meetings and activities might help to produce important positive changes in mentees' PCL and hence in their school performance.

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