Students’ individual and collective efficacy: joining together two sets of beliefs for understanding academic achievement

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Abstract In this paper, we assume that students’ achievement is influenced not only by a set of individual appraisals such as beliefs about their personal efficacy but also by a set of more systemic factors related to beliefs about their class efficacy as a group. Literature and research review supports that students’ beliefs about their efficacy, both as individuals and as groups, are important predictors of their achievements at school. However, little research has been presented to date that jointly explores the impact of these two sets of beliefs on academic achievement. Therefore, the aim of this paper is to present an integrated view of individual and collective efficacy beliefs, exploring the relationship between them and their causal relationship with students’ achievement. Two cross-sectional studies were developed in the Portuguese secondary school context with 385 and 1,794 students, using Academic Self-Efficacy Scale and Students Collective Efficacy Scale to assess individual and collective efficacy beliefs. The main results showed that individual efficacy beliefs were stronger predictors of students’ grades than collective efficacy beliefs, especially when the specific domain of achievement they refer to was considered (for instance, levels of mathematics self-efficacy had a stronger impact on mathematics grades than on Portuguese grades). Moreover, moderating effects of gender and type of school (public vs. non-public) were found, suggesting that collective efficacy beliefs play a more significant role among boys and among students from public schools.

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Introduction

General background and aim

Since the early 1970s, efficacy-related constructs have been theorized and empirically explored, establishing new trends in the study and understanding of success and failure phenomena in achievement settings (e.g. Bandura 1977a; Dweck 1975; Rotter 1966; Weiner 1979; Weiner et al. 1976). Throughout over four decades, research has systematically suggested that efficacy beliefs are major determinants of individuals and groups’ motivation and achievement, either at school and work or in society and life in general (cf. Bandura 1982, 1997; Klassen et al. 2011; Linnenbrink and Pintrich 2003; Pajares 1997; Pajares and Schunk 2005; Schunk 1989; Schunk and Pajares 2005). According to Bandura (2000, 2006), these efficacy beliefs may be grounded either in more individual or in more systemic appraisals, giving the basis to the definition of two different yet related constructs: the self-efficacy (i.e. the perceived personal efficacy) and the perceived collective efficacy. These two different sets of beliefs are assumed to play a key role in the orientation of individuals’ behaviour, consequently determining how well they achieve their aims, whether as individuals or as groups.

Considering the school context in particular, individual and collective efficacy beliefs have been presented as important predictors of academic achievement-related behaviours (Manthey 2006; Pajares 1996c). Literature suggests that students’ self-efficacy influences their perceptions about school tasks, their choices about which strategies to use, the amount of effort they put on their actions, their resilience to adversity and obstacles, how long they persist when facing failure, how confident they feel when striving for success as well as their performance levels and their school grades (Bandura 1997, 2006; Linnenbrink and Pintrich 2003; Pajares 2003; Pajares and Schunk 2001; Schunk and Pajares 2005). Moreover, as students belong to groups and to wider systems (e.g. the class, the school, …), the collective sense of efficacy at school may also influence their motivation for action, how much they feel supported to master and to strive for success and how well they perform at school (Goddard 2001; Manthey 2006; Tschannen-Moran and Barr 2004).

These assumptions have globally found empirical support. On the one hand, results from PISA study show that students’ self-efficacy was closely and positively related to their performance in mathematics and science (OECD 2004, 2007). Results from other international studies corroborated these findings (e.g. Bong 2002; Choi 2005; Diseth 2011; Kitsantas et al. 2011; Multon et al. 1991). Also, national studies conducted in Portugal (e.g. Almeida et al. 2004; Pina-Neves and Faria 2007, 2010b) suggested that academic self-efficacy beliefs are a very strong and positive predictor of achievement in Portuguese and mathematics subjects, giving support to its microanalytic nature (i.e. the more specific these efficacy beliefs are measured, the more predictive they are). On the other hand, a growing body of research has been testifying to the impact of collective efficacy beliefs on students’ motivation and performance, showing that higher levels of perceived collective efficacy are associated with higher motivational levels, stronger resilience and better academic accomplishments (e.g. Hoy et al. 2002; Lin and Chou 2009; Salanova et al. 2003). Some empirical evidence supporting the microanalytic nature of collective efficacy beliefs was also found (e.g. Klassen 2003).

Nonetheless, two issues emerge on this field: (1) The majority of the research on collective efficacy in academic settings focuses mostly on teachers’ collective efficacy and on how it may influence students’ performance, leaving aside important questions about how students’
collective sense of efficacy as a class might affect their own achievement as individuals, and (2) little research has been presented to date that simultaneously addresses the effects that efficacy beliefs, both individual and collective, have on students’ motivation and achievement. Studies by Klassen (2003) and Katz-Navon and Erez (2005) constitute some interesting works around these issues, but they both focus on group performance variables.

Thus, the aim of this paper is to present an integrated view of student’s individual and collective efficacy beliefs, exploring the relationship between these two sets of beliefs in the academic setting, as well as their role as causal determinants of students’ individual achievement. Our general background is set upon Bandura’s (1977b, 1982, 2000) self-efficacy framework and social learning theory.

On the search for a more comprehensive model on efficacy beliefs

Definitions and domain specification

Self-efficacy was first defined by Bandura in the 1970s as the belief that one can produce desired results and succeed achieving aims through one’s own actions (cf. Bandura 1977a). Later, assuming that individuals do not act only in their own sphere but also taking part in social interactions, collective efficacy was introduced to illustrate the beliefs that are shared by a group of individuals (e.g. a team, a class, a family) considering how well they can achieve their goals and succeed as a group (cf. Bandura 1982, 2000). In the same way, collective group performance is the product of the interactive dynamics of its members, and collective efficacy is far beyond being just a sum of the group members’ individual efficacy beliefs. As stressed by Bandura (2000, p. 76), it is rather an “emergent group-level property.”

Following Bandura’s framework and considering the microanalytic nature of these efficacy appraisals, we can define individual and collective efficacy beliefs for the academic setting in particular, assuming that the aims, goals and desired results to be attained are related to specific academic tasks and activities. Hence, students’ individual efficacy beliefs (or academic self-efficacy) are beliefs that each student has about him/her being able to successfully accomplish a certain academic task or activity, while students’ collective efficacy beliefs (or academic collective efficacy) represent the beliefs that students share about their class (or any other group they belong to) being able to successfully accomplish a certain academic task or activity as a group (cf. Pajares 1996c; Pina-Neves and Faria 2007; Schunk 1989, 1991).

Figure 1 illustrates how self-efficacy can be conceptualized and operationalized at different levels of specification. For instance, academic self-efficacy corresponds to the self-efficacy construct defined at the setting level. The same specification scheme can be applied to the collective efficacy construct (e.g. general collective efficacy, academic collective efficacy and collective efficacy in mathematics). This diagram allows us to understand at what levels efficacy beliefs constructs can be defined and how microanalytic they can be. Nevertheless, for methodological reasons, several authors emphasize that efficacy beliefs must be defined and measured at least at the domain-level of specification. As Pajares (1996a, p. 2) states, “Domain-specific assessments (…) are more explanatory and predictive than omnibus measures and preferable to general academic judgements” (see also Bandura 1997; Bong 2006; Bong and Clark 1999; Pajares 1996a; Pajares and Miller 1995).

Contributions for a causal path model

Individual efficacy beliefs have been integrated in broad models for explaining motivation and achievement in academic settings. In these models, individual efficacy beliefs, or self-efficacy, share their predictive role with other self-appraisals and motivational constructs,
such as academic self-concept, perceptions of causality, effort beliefs, self-regulation ability, goal orientation, among others (e.g. Ferla et al. 2010; Pina-Neves and Faria 2007, 2010b; Skinner et al. 1990), being positioned as a direct predictor of achievement, or sometimes as a mediator variable between the other self-constructs and students’ achievement levels. The validation of these models suggests that individual efficacy beliefs have a strong and positive direct effect on students’ achievement levels.

As to collective efficacy beliefs, they have also been studied within achievement models. For instance, Hoy et al. (2002) developed and tested a model which indicated that collective efficacy had a positive influence on students’ mathematics achievement. Stajkovic et al. (2009) observed, too, that collective efficacy fully mediated the relationship between group potency (perceived group potential performance level across different situations) and group performance levels. However, only a few studies consider the shared impact that students’ individual and collective efficacy beliefs might have on their achievement. As we have mentioned, studies by Klassen (2003) and Katz-Navon and Erez (2005) presented an interesting integrative approach to individual and collective efficacy beliefs, though they were developed in laboratory conditions and focused on group performance variables. For example, regarding the predictive power of self- and collective efficacy, Katz-Navon and Erez (2005) observed that it was significantly dependent on task interdependence perception. Results showed that collective efficacy predicted group performance only when a highly interdependent task required group members to interact and coordinate their efforts, whereas under low levels of task interdependence, collective efficacy had no significant impact on group performance. In contrast, self-efficacy emerged as a meaningful construct that explained performance under low task interdependence conditions. As we can see, this integrated approach brings new information to the efficacy beliefs research and debate, but we may still ask the question of how significant their predictive power is when individual achievement is considered.

Accordingly, based on literature and on previous research findings, we present a causal path model, which integrates both individual and collective efficacy beliefs as achievement predictors (Fig. 2). In this model, we assume that (1) these two sets of beliefs are positively correlated with each other and that (2) they are both positive predictors of students’ achievement. Nonetheless, as we are here considering students’ individual achievement,
we expect individual efficacy beliefs to have a stronger impact on achievement levels, compared to collective efficacy beliefs, as these appear to be more prominent under higher task interdependence conditions.

Finally, these linear relationships may be affected by other personal and contextual factors. Thus, in this model, we will also consider two additional variables that may have a moderating effect on the causal link between efficacy beliefs and academic achievement. These variables are gender and type of school (Fig. 2).

**Gender and type of school effects**

Gender is one of the most prominent variables in the field of differential psychology (Reuchlin 2002). Regarding motivation characteristics, gender differences start emerging as early as around 3 years old, suggesting that this differentiation process begins within family and proceeds afterwards among peers and at school (Hyde and Durik 2005), becoming more significant in the adolescence stage due to the socialization and cultural dynamics regarding gender roles. Nonetheless, although some gender differences have been disappearing (Faria 2002; Faria and Fontaine 1997; Feingold 1988, 1993; Lima Santos and Pina-Neves 2007), other male and female differences still remain (e.g. specific intellectual skills and certain motivation and personality characteristics, emotional competence—for further reading, see Lippa 2005).

Regarding efficacy beliefs particularly, international findings are not always consistent with each other. On the one hand, there is evidence for no gender differences in efficacy beliefs.
beliefs levels for mathematics and writing tasks (e.g. Pajares 1996b; Pajares and Graham 1999; Pajares et al. 1999; Pajares and Valiante 1999; Smith et al. 2002). On the other hand, there is also evidence for significant differences between boys and girls efficacy beliefs (e.g. Meeece and Jones 1996; Pintrich and De Groot 1990; Skaalvik 1990; West et al. 2002) that tend to reflect the microanalytic nature of efficacy constructs, suggesting that these gender differences are very task-specific. For instance, boys tend to show higher levels of perceived efficacy for sciences and for spatial-related activities and tasks (e.g. Mecece and Jones 1996; West et al. 2002), whereas girls reveal higher levels of perceived efficacy for verbal and language-related tasks (e.g. Skaalvik 1990).

In contrast, findings in Portugal tend to be more consistent across studies. No gender differences are found for general efficacy beliefs (Coimbra 2000) and for efficacy beliefs that report to mathematics tasks and activities (Coimbra 2000; Pina-Neves 2007), while girls tend to present higher expectations of efficacy for Portuguese subject tasks, such as accomplishing grammar exercises and understanding compulsory literature readings (Pina-Neves 2007). Moreover, curious results have been found within PISA study (Schulz 2005; cf. OECD 2004), showing that the difference between Portuguese boys and girls for mathematics self-efficacy was the smallest of the 30 OECD countries that participated in the second survey of the programme; the standardized difference for the Portuguese sample was $-0.17$ (slightly but not significantly favouring boys), while the OECD countries average difference was $-0.37$. Hence, the findings on Portuguese gender differences appear to be more consistent across studies, and the significant differences tend to be restricted to the verbal domain of achievement. These evidences may be a reflection of several political and social changes that have been taking place in Portugal over the last three decades, which have given women more prominent positions in society (Faria 2002; Ferreira 2002; Morais and Carvalho 1993), though gender inequalities still exist (Carvalho and Santiago 2010; Hausmanann et al. 2010), and have given even support to the development of a renovated female gender values profile (Lima Santos and Pina-Neves 2007), fading away some gendered differences in Portuguese society. However, as gender still plays an important role in the self-beliefs development and differentiation, especially in the academic setting, we considered it useful to include gender in the model to scrutinize related moderating effects.

Apart from gender, context variables also play a key role in the orientation of academic behaviour and performance. Taken together, literature and research suggest that aspects such as the characteristics of the class or the characteristics of the school have an impact on students’ motivation and achievement, also applying for the explanation of success and failure at school (e.g. Pont et al. 2008a, 2008b; Scheerens 2004; Sweetland and Hoy 2000; Urdan and Turner 2005).

The “big–fish little–pond effect” (Marsh and Parker 1984) is an example of how contextual factors, such as the class, can make a difference in self-appraisals related to achievement settings. This effect has been validated in many countries, including Portugal (cf. Marsh and Craven 2000; Marsh and Hau 2003), and it explains why students at the same intellectual level had perceptions of lower competence when they were in a class with brilliant students but had a better perception of their personal competence when their peers had lower intellectual ability and poorer results. Accordingly, students’ self-perceptions and self-beliefs are also built through a normative process because they compare their own competence and performance levels with those shown by the group they belong to.

The type of school (public vs. non-public) seems also to impact on students’ achievement. For instance, Boerema (2009) found significant differences in students’ average performance levels, comparing public and non-public schools: Students’ average achievement was slightly higher at non-public schools than at public schools. Similarly, PISA’s third
survey results (cf. OECD 2007) show that students with higher achievement levels attend non-public schools and belong to higher socioeconomic status families. In Portugal, there is also some evidence for these effects, but they seem to be very subtle. In fact, retention rates are higher in public school sector (GEPE 2010), but this might be because public school population is more heterogeneous, and not necessarily worse considering achievement levels. Besides, high achievers are also attending public schools. We also know that around 30 % of the Portuguese secondary students’ population chooses a non-public school (GEPE 2010). Choosing this type of school may lie on the fact that it is perceived as being more prestigious compared to a public school and that it may better prepare students’ for entering the university after they complete their secondary studies. Nevertheless, this choice is highly dependent on socioeconomic factors. Only a small amount of the non-public school students is subsidize, either by the government supporting programmes or by other institutions (e.g. scientific organisms, cultural foundations, ...). So, students’ socioeconomic background significantly impacts their choice to attend a non-public school.

Moreover, there are no studies addressing the effect that the type of school might have on students’ efficacy beliefs development and on the way these affect achievement. Some preliminary findings, in a Portuguese sample, suggested that the type of school may produce an important moderating effect, as collective efficacy beliefs had a significant impact only on public school students’ achievement in Portuguese subject. Besides, individual efficacy beliefs emerged as significant predictors of achievement in both types of school, but their impact was much more restricted among non-public school students (Pina-Neves and Faria 2010a).

These preliminary findings suggest that the type of school students attend may motivate them differently to act and achieve in these academic settings. This is an issue we will address in one of the following studies.

Study 1

Aim

The aim of this first study was to investigate how individual and collective efficacy beliefs relate to each other and how well they can jointly predict students’ achievement.

Method

Participants

In this first study, participants were 385 Portuguese students. They were boys (44.4 %) and girls (55.6 %), from the 10th (36.6 %), 11th (31.9 %) and 12th (31.4 %) grades, attending

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2 For clarification, the Portuguese educational system includes a 12-year compulsory school, divided into basic education with three cycles (first cycle has 4 years, second cycle has 2 years and third cycle has 3 years) and secondary education with 3 years of studies. When students enter secondary school, they may choose among a variety of courses leaning to different areas (e.g. natural sciences, socioeconomic sciences, languages and humanities, sports, arts, ...), which can be more scientific-oriented or more professional-oriented. Overall, this educational system in known to be mainly competitive in nature, especially during the secondary schooling, as the majority of students is focused on accomplishing national exams in order to enter the university. The type of instruction is mainly teacher lead, though there is an amount of group work and other activities and dynamics that specially seek to apply classes’ contents to real-life situations.
two secondary public schools. They were 13 to 22 years old ($M=16.3$; $SD=1.25$) and were distributed across three different socioeconomic status: low (38.0 %), medium (31.4 %) and high (30.6 %). The majority of them had never flunked a school year (77.6 %) and had positive grades in Portuguese (89.9 %) and mathematics (78.8 %) subjects, as well as a positive GPA (96.6 %).

**Measures**

Measures included the **Academic Self-Efficacy Scale—Revised** (ASES-R) and the **Students Collective Efficacy Scale** (SCES). ASES was built by Pina-Neves and Faria and has 26 items that evaluate students’ individual efficacy beliefs in three domains: **General School Subjects Self-Efficacy** (eight items), **Portuguese Self-Efficacy** (eight items) and **Mathematics Self-Efficacy** (ten items). Examples of the items included are: “I will be able to improve my poorest marks throughout the year”, “I will be able to read and understand the compulsory readings for the Portuguese subject” and “I will be able to solve mathematics exercises, even those that demand more complex computations.” Each item is rated on a six-point scale, anchored at $1 = completely disagree$ and $6 = completely agree$. Several psychometric studies (Pina-Neves and Faria 2006, 2011) have shown good construct validity (i.e. confirmatory factor analyses validated a three-factor model consistent with ASES’s theoretical rational), good internal consistency (i.e. Cronbach’s alpha coefficients ranging from 0.88 to 0.98) and good sensitivity indexes for ASES’s items and dimensions. Recently, ASES was revised, keeping 22 of the 26 original items: **General School Subjects Self-Efficacy** (seven items), **Portuguese Self-Efficacy** (seven items) and **Mathematics Self-Efficacy** (eight items). The revised version was used in this study.

SCES was also developed by Pina-Neves and Faria to evaluate students’ beliefs about their collective efficacy as a group (class). It is a 21-item scale and has five dimensions: **Learning and Achieving** (five items), **Class Learning Environment** (four items), **Peers Relationship** (five items), **School Environment** (three items) and **Ethics** (four items). Examples of the items included are: “As a group, my class is able to achieve good grades in all subjects”, “As a group, my class is able to enhance a good learning environment”, “As a group, the students of my class are able to maintain a good relationship with each other”, “As a group, my class is able to contribute to a good school environment” and “As a group, the students of my class are able to respect their teachers.” Items are scored on a six-point scale (1 = completely disagree and 6 = completely agree). SCES also allows calculating an overall score. Recent psychometric studies (Pina-Neves and Faria 2011) supported SCES’s construct validity (e.g. confirmatory factor analyses validated a model consistent with the scale’s theoretical rational), as well as its dimensions’ internal consistency (e.g. Cronbach’s alpha coefficients ranging from 0.81 to 0.88).

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3 In the Portuguese secondary education, students are classified in each subject in a scale ranging from 0 to 20 points. A positive grade would be a 10 points grade or higher. The school year is divided into three trimesters. There are regular assessment moments throughout and in the end of the year, and students’ achievement is evaluated using formal tests and final exams. Achievement grades used in study 1 refer to the end of the first trimester.

4 SCES is an individual measure, but, as shown by the examples of the items, it focuses on collective evaluations. It allows capturing student’s appraisals about the collective efficacy of its class as a group. So, these appraisals correspond to collective beliefs and differ from the beliefs about the self, in the way that the student thinks about its class as a whole group, rather than about his/her particular feelings as an element of its class.
In addition, students’ grades in Portuguese and mathematics subjects and GPA were used as indicators of their achievement at school.5

Procedure

After schools’ permission and participants’ consent, data were collected at each school, in the classroom setting. Students’ response time was approximately 15 min. The main statistical procedures used were correlation and multiple linear regression analysis (step-wise method), computed in SPSS Statistics 18.0 for Windows.

Results

Zero-order correlations were used as the starting point to analyse the causal structure of the data. First, results showed positive and significant correlations among ASES’s dimensions (coefficients ranging from 0.34 to 0.67; \(p<0.001\)) and among SCES’s dimensions as well (coefficients over 0.59; \(p<0.001\)). Nonetheless, as shown in Table 1, correlations between ASES and SCES’s dimensions were not significant, except for the correlation between General School Subjects Self-Efficacy and Peers Relationship.

Furthermore, correlations with students’ grades showed that only ASES’s dimensions were significantly correlated with Portuguese and mathematics grades and with GPA (Table 2) and that the correlation coefficients were higher when the specific self-efficacy dimensions and the grade subject domains were directly related to each other. For instance, Portuguese Self-Efficacy was more strongly associated with Portuguese grades than with mathematics grades.

Stepwise regression analyses also revealed these trends (Tables 3, 4 and 5), showing that Portuguese Self-Efficacy was the strongest predictor for Portuguese grades and Mathematics Self-Efficacy was the strongest predictor for mathematics grades. Furthermore, Mathematics Self-Efficacy, Class Learning Environment and Peers Relationship were also significant, though weaker, predictors of Portuguese grades; Ethics and Class Learning Environment were secondary predictors of mathematics grades. For GPA, Mathematics Self-Efficacy emerged as the strongest predictor, followed by Portuguese Self-Efficacy, Class Learning Environment and Peers Relationship.

Study 2

Aim

This study set out to investigate the impact of individual and collective efficacy beliefs on students’ achievement and to explore the moderating effects of gender and type of school (public vs. non-public). Figure 2 depicts the causal path model to be tested through structural equation modelling and multigroup invariance analysis.

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5 During secondary education, Portuguese classes are essentially focused on Literature, with several compulsory readings, but they also cover some contents on Listening, Oral Expression, Writing and Language Functioning. As for the mathematics program, it is essentially an analysis-based program (covering Geometry, Functions, and Trigonometry) with some Statistics and Probabilities.
Participants

Participants were 1,794 Portuguese students from 10th (37.5 %), 11th (32.2 %) and 12th (30.2 %) grades, attending public (60.1 %) and non-public (39.9 %) secondary schools. They were boys (45.4 %) and girls (54.6 %), aged 14 to 21 years old (M=6.3; SD=1.06), from different socioeconomic status: low (2.0 %), medium low (18.5 %), medium (24.2 %), medium high (27.8 %) and high (27.6 %). The majority of these students had never flunked a school year (82.2 %) and had positive grades in Portuguese (89.3 %) and mathematics (75.5 %) subjects, as well as a positive GPA (95.0 %). Students’ GPA was 13.8 points (in a scale ranging from 0 to 20 points), and their average grades in Portuguese and mathematics subjects were 13.2 points and 12.6 points, respectively. These grades refer to the end of the school year classifications (third trimester).

Measures and procedure

Data were collected using ASES-R and SCES with procedures similar to those used in study 1, and students’ grades in Portuguese and mathematics subjects and GPA were again used as indicators of academic achievement. Data analysis was performed in EQS 6.1 for Windows.

| Table 1 | Zero-order correlations between ASES and SCES’s dimensions |
|---------|---------------------------------|
| Dimensions | Portuguese Self-Efficacy | Mathematics Self-Efficacy | Gen. School Self-Efficacy |
| Learning and Achieving | 0.00 | 0.04 | 0.05 |
| Class Learning Environment | 0.01 | 0.04 | 0.07 |
| Peers Relationship | 0.06 | 0.06 | 0.14* |
| School Environment | 0.02 | 0.02 | 0.03 |
| Ethics | 0.04 | 0.02 | 0.04 |
| SCES total score | 0.00 | 0.04 | 0.08 |

*p<0.01

| Table 2 | Zero-order correlations of ASES and SCES’s dimensions with students’ grades |
|---------|-----------------|-----------------|-----------|
| Dimensions | Portuguese grades | Mathematics grades | GPA |
| Portuguese Self-Efficacy | 0.52* | 0.20* | 0.36* |
| Mathematics Self-Efficacy | 0.37* | 0.61* | 0.52* |
| Gen. School Self-Efficacy | 0.41* | 0.38* | 0.45* |
| Learning and Achieving | 0.02 | 0.04 | 0.01 |
| Class Learning Environment | 0.07 | 0.01 | 0.07 |
| Peers Relationship | 0.05 | 0.04 | 0.07 |
| School Environment | 0.04 | 0.03 | 0.03 |
| Ethics | 0.06 | 0.04 | 0.06 |
| SCES total score | 0.02 | 0.01 | 0.02 |

*p<0.01
Structural equation modelling was used for testing the causal path model and validating a baseline model, which was then submitted to multigroup metric invariance analysis to test gender and type of school moderating effects (correlation and regression coefficients were constrained). Throughout the invariance analysis process, parameters constraints were released one by one based on LM Test for Releasing Constraints suggestions.

Results

The validated causal path model

Figure 3 depicts the validated causal path model ($\chi^2(262) = 748.5, p < 0.001; \chi^2/df = 2.86; \text{NNFI} = 0.96; \text{CFI} = 0.96; \text{RMR}_{st} = 0.04; \text{RMSEA} = 0.05$). We observed positive and significant correlations among individual and collective efficacy dimensions, except for the correlation between Portuguese Self-Efficacy and Collective Efficacy Beliefs dimension. The strongest correlation coefficients emerged between General School Subjects Self-Efficacy and each of the two specific self-efficacy dimensions: Portuguese and Mathematics Self-Efficacy, while the weakest coefficients were found for the Collective Efficacy Beliefs dimension when this was correlated with each of the three self-efficacy dimensions, which represent students’ individual efficacy beliefs.

Regarding the causal paths towards achievement, there were eight significant direct effects. We observed that each of the three self-efficacy dimensions had a positive impact on the specific domain of achievement they relate to (e.g. Portuguese Self-Efficacy →

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**Table 3** Stepwise regression analysis for Portuguese grades

| Model | Predictors | Std. beta | Adjusted $R^2$ | Sig. F change |
|-------|------------|-----------|----------------|---------------|
| M1    | Portuguese Self-Efficacy | 0.49*** | 0.24^a | 0.00 |
| M2    | Portuguese Self-Efficacy | 0.42*** | 0.29^b | 0.00 |
|       | Mathematics Self-Efficacy | 0.24*** |       |       |
| M3    | Portuguese Self-Efficacy | 0.41*** | 0.30^c | 0.03 |
|       | Mathematics Self-Efficacy | 0.24*** |       |       |
|       | Class Learning Environment | 0.11* |       |       |
| M4    | Portuguese Self-Efficacy | 0.40*** | 0.31^d | 0.03 |
|       | Mathematics Self-Efficacy | 0.24*** |       |       |
|       | Class Learning Environment | 0.21** |       |       |
|       | Peers Relationship | 0.14* |       |       |

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

^a $F(1, 315) = 100.72, p < 0.001$

^b $F(2, 314) = 64.61, p < 0.001$

^c $F(3, 313) = 45.38, p < 0.001$

^d $F(4, 312) = 35.49, p < 0.001$

(cf. Bentler 2006; Byrne 2006). Structural equation modelling was used for testing the causal path model and validating a baseline model, which was then submitted to multigroup metric invariance analysis to test gender and type of school moderating effects (correlation and regression coefficients were constrained). Throughout the invariance analysis process, parameters constraints were released one by one based on LM Test for Releasing Constraints suggestions.

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6 Global fit indexes were chi-squared ($\chi^2$), Bentler–Bonett nonnormed fit index (NNFI), comparative fit index (CFI), root mean-squared residuals—standardized (RMR$_{st}$) and root mean-squared error of approximation (RMSEA). Adjusted values for these indexes were considered when normal distribution assumption was not verified (cf. Bentler 2006; Byrne 2006).

7 In this study, collective efficacy beliefs were considered as a whole dimension. As described in the “Measures” section of “Study 1”, it is possible to consider an overall dimension for the SCES.
Portuguese grades; Mathematics Self-Efficacy → mathematics grades). Further, these corresponded to the strongest causal effects. We also noted that mathematics grades and GPA had two significant predictors (Mathematics and General School Self-Efficacy), while Portuguese grades variance explanation was shared by Portuguese Self-Efficacy along with Mathematics Self-Efficacy, General School Subjects Self-Efficacy and Collective Efficacy Beliefs. This last dimension had a positive, though very weak, impact on Portuguese grades.

Overall, this validated baseline model confirmed the assumptions of the efficacy beliefs integrated model illustrated in Fig. 2. We noticed that individual and collective efficacy beliefs were positively correlated with each other, though correlation coefficients were weak. We also observed that individual efficacy beliefs were the strongest predictors of academic achievement, especially when each self-efficacy dimension was paired with the domain of achievement it directly relates to.

### Metric invariance analyses by gender and type of school

Preliminary invariance analyses allowed us to validate a baseline model for each gender and type of school, which revealed to be invariant in its configuration for boys and girls and for public and non-public school students. Then, metric invariance analyses showed that the structural parts of the models were not totally invariant across gender and across the two types of school. Though it did not compromise the models’ global fit (Table 6), this partial invariance indicated that there were some significant moderating effects to be considered.

Regarding gender (Fig. 4), Portuguese Self-Efficacy was a slightly stronger predictor of Portuguese grades among girls, while Mathematics Self-Efficacy revealed to be a more prominent determinant of school grades (in Portuguese, in mathematics and also at school in general) among boys. Moreover, Collective Efficacy Beliefs dimension significantly contributed to boys’ Portuguese grades, but not to those of girls.

Considering the type of school (Fig. 5), the main significant moderating effects referred to causal paths towards Portuguese grades. As shown, Portuguese and Mathematics Self-
Efficacy were stronger determinants of Portuguese grades among students from non-public schools, while General School Self-Efficacy and Collective Efficacy Beliefs dimension had a more important role predicting the same grades among students from public schools. Besides, among students from non-public schools, Collective Efficacy Beliefs dimension had no significant effect on Portuguese grades.

![Validated causal path model](image)

**Table 5** Stepwise regression analysis for GPA

| Model | Predictors                                      | Std. beta | Adjusted $R^2$ | Sig. F change |
|-------|-------------------------------------------------|-----------|----------------|---------------|
| M1    | Mathematics Self-Efficacy                       | 0.52***   | 0.27           | 0.00          |
| M2    | Mathematics Self-Efficacy Portuguese Self-Efficacy | 0.44***   | 0.31           | 0.00          |
| M3    | Mathematics Self-Efficacy Portuguese Self-Efficacy Class Learning Environment | 0.45***   | 0.32           | 0.01          |
| M4    | Mathematics Self-Efficacy Portuguese Self-Efficacy Class Learning Environment Peers Relationship | 0.45***   | 0.34           | 0.00          |

*p* <0.05; **p** <0.01; ***p*** <0.001

\[ F(1, 317) = 177.43, p <0.001 \]

\[ F(2, 316) = 71.76, p <0.001 \]

\[ F(3, 315) = 50.77, p <0.001 \]

\[ F(4, 314) = 41.86, p <0.001 \]

**Fig. 3** Validated causal path model
Analysing together individual and collective efficacy beliefs offers an integrated approach to understanding the importance of these two sets of beliefs in the explanation of students’ achievement. Overall, the results from the two studies described above are consistent with the assumptions of the model presented in Fig. 2.

Accordingly, students’ collective efficacy beliefs seem to be positively, though weakly, associated to their individual efficacy beliefs. As shown in study 1, only the peers’ relationship collective dimension was associated with the general school individual efficacy dimension. In study 2, too, collective efficacy beliefs dimension had positive, though weak, correlations with the three self-efficacy dimensions. Moreover, as expected, both studies evidenced that individual efficacy beliefs were stronger and more significant determinants of students’ achievement in Portuguese and mathematics subjects and at school, compared to

### Table 6  Multigroup metric invariance analyses for gender and type of school

| Tested hypotheses        | $\chi^2$  | $df$ | $\chi^2/df$ | NNFI | CFI  | RMR$_{at}$ | RMSEA |
|--------------------------|---------|-----|------------|------|------|------------|-------|
| For gender               |         |     |            |      |      |            |       |
| Equal coefficients       | 555.9*  | 298 | 1.87       | 0.95 | 0.96 | 0.05       | 0.05  |
| Equal coefficientsa      | 511.3*  | 292 | 1.75       | 0.96 | 0.96 | 0.04       | 0.05  |
| For type of school       |         |     |            |      |      |            |       |
| Equal coefficients       | 544.7*  | 298 | 1.83       | 0.95 | 0.96 | 0.04       | 0.05  |
| Equal coefficientsb      | 524.0*  | 293 | 1.79       | 0.96 | 0.96 | 0.04       | 0.05  |

**a** Except for the bold regression coefficients shown in Fig. 4  
**b** Except for the bold regression coefficients shown in Fig. 5

### Discussion

Analyzing together individual and collective efficacy beliefs offers an integrated approach to understanding the importance of these two sets of beliefs in the explanation of students’ achievement. Overall, the results from the two studies described above are consistent with the assumptions of the model presented in Fig. 2.

Accordingly, students’ collective efficacy beliefs seem to be positively, though weakly, associated to their individual efficacy beliefs. As shown in study 1, only the peers’ relationship collective dimension was associated with the general school individual efficacy dimension. In study 2, too, collective efficacy beliefs dimension had positive, though weak, correlations with the three self-efficacy dimensions. Moreover, as expected, both studies evidenced that individual efficacy beliefs were stronger and more significant determinants of students’ achievement in Portuguese and mathematics subjects and at school, compared to

![Diagram](image)

*Fig. 4  Moderating effects of gender. Only the structural part of the model and the causal paths that are significant for at least one group are presented. Coefficients shown in bold represent the significant moderating effects of gender. Coefficients for boys appear in brackets*
collective efficacy beliefs. This suggests that individual efficacy beliefs play a more prominent role explaining students’ individual achievement levels than collective beliefs. At the same time, collective efficacy beliefs may be more determinant for achievement levels when these depend more on the collective contributions to performance. Bandura (1997, 2000) noted that these differences and previous research have found similar evidences for group performance situations (e.g. Katz-Navon and Erez 2005; Klassen 2003). Therefore, it seems consistent that individual efficacy beliefs emerged both in study 1 and in study 2 as the main causes for what are, in essence, individual performances. This might also explain why collective efficacy beliefs emerged here as weak, and often not significant, predictors of students’ individual achievement.

These findings suggest that students may consider their individual attainments as being more dependent on individual variables related to their own skills, competences and efficacy, rather than on collective characteristics related to group abilities and efficacy. These results also suggest that achievement at school is mainly being seen in individualistic terms (cf. Ciochină and Faria 2009), which is consistent with the fact of Portuguese schooling being competitive in nature and strongly oriented for the individual dimension. In the other hand, this individual orientation contrasts with other life contexts. When students leave school, working collectively and using social and cooperative competences may be essential for success, which means that school and work life value collective dynamics differently. This reasoning is especially central if we consider secondary schooling and can offer some contribution to reflect on the current educational practice.

Taken together, our findings underline the idea that individual efficacy beliefs, compared to collective efficacy beliefs, are stronger predictors of Portuguese and mathematics achievement, as well as of general school academic achievement. Nonetheless, the significant positive impact of collective efficacy beliefs on Portuguese grades in study 2 showed that Portuguese subject is perceived as a domain where the collective sense of efficacy as a group may also influence students’ performance, along with their individual efficacy appraisals. Portuguese subject is known to be a more transverse domain, compared to other achievement domains such as mathematics, since it concerns language and communicating skills.

Fig. 5  Moderating effects of type of school. Only the structural part of the model and the causal paths that are significant for at least one group are presented. Coefficients shown in bold represent the significant moderating effects of type of school. Coefficients for non-public schools appear in brackets.
that are shared and used by all academic subjects across the whole school curriculum (ME/DEB 2001) and that can be applied to a very wide variety of domains. This might explain why Portuguese grades were influenced by a larger number of efficacy dimensions, including individual and collective beliefs. This is an important topic to be further explored, given that Portuguese subject is one of the core subjects within the national school curriculum.

Considering the microanalytic nature of efficacy beliefs (Bandura 1997, 2000; Klassen 2003; Pina-Neves and Faria 2009), we observed, as expected, that the more specific they are, the better they predict achievement. Portuguese and Mathematics Self-Efficacy were, in both studies, the strongest predictors for Portuguese and mathematics grades, respectively. Hence, specific individual efficacy beliefs demonstrated to play a more prominent role in achievement prediction, compared to more general and even to more collective dimensions, as discussed above. This microanalytic nature has consistently been documented in previous studies, while several authors highlight the need for specificity in efficacy measures (Bong 2002, 2006; Klassen 2003; Pajares 1996a) because their predictive power appears to be dependent on their specificity levels of assessment. In addition, collective efficacy beliefs seem to have a slightly weaker predictive power over achievement compared to individual efficacy beliefs (Klassen 2003) because they often tend to be less specific.

Furthermore, invariance analyses bring a wider reflection on this issue, as we observed that the impact of individual and collective efficacy beliefs on academic achievement may in part depend on gender and on the type of school students attend. Analysing the significant moderating effects of gender and type of school, we noted that collective efficacy beliefs had a significant impact on Portuguese grades only for boys and for students from public schools, which suggests that these two groups might be more sensitive to the contextual influence, as represented by the class perceived efficacy. This may also indicate that girls and students attending a non-public school are more focused on individual features and may see their performance as being more dependent on their own characteristics, such as their individual perceived efficacy, rather than on systemic or more collective variables, such as their class’ global perceived efficacy.

In the one hand, these findings are easy to explain when we consider students attending a non-public school, which is known to represent a highly competitive context (Boerema 2009; Pina-Neves and Faria 2010a; Sweetland and Hoy 2000), where students are more involved in obtaining good results and motivated by performance-oriented goals in order to enter university. Thus, these students might feel that their academic accomplishments (mostly related to their school grades) depend mainly on their own capacities, efforts and efficacy. Similarly, previous findings with a Portuguese sample indicated that collective efficacy beliefs had a significant impact on achievement of students from public schools only (Pina-Neves and Faria 2010a).

On the other hand, when we consider the impact collective beliefs have among boys, the interpretation of these findings is not as obvious as we could expect. For instance, according to the traditional gender stereotypes, women are seen as being more sociable than men (Brannon 2011; Lippa 2005). Thus, girls would be expected to present themselves as being more sensitive to the influence of their class efficacy. Yet, girls are also known as being more careful and diligent with their tasks at school, and this may well explain why they are more focused on individual aspects compared to boys.

Not so surprising was the finding that Portuguese efficacy beliefs emerged as a stronger predictor among girls, whereas mathematics efficacy beliefs emerged as a stronger predictor among boys, as this is in turn consistent with the traditional gender stereotypes (Brannon 2011; Lippa 2005). These findings reinforce the idea that, although gender differences have been disappearing, as mentioned before (e.g. Feingold 1988, 1993; Lima Santos and Pina-
Neves 2007), there are some gendered self-perceptions and self-appraisals that remain significant, indicating that boys and girls do not perceive themselves the same way. This might affect their motivation, their expectations, their goals, their performance and their results. In this particular situation, Portuguese efficacy beliefs seem to have a more determinant role on girls’ achievement, while for boys mathematics efficacy beliefs appear to play the leading part influencing their academic accomplishments.

Concluding remarks: limitations and future directions

Picturing an integrated model of individual and collective efficacy beliefs allows us to consider that performance and achievement may be dependent on more than individual self-appraisals. As we noted, these two sets of beliefs jointly and positively contributed to the explanation of academic achievement, though collective beliefs appeared to have a weaker impact, as we were mainly considering students’ individual achievement.

Overall, our findings are consistent with the assumptions of the model initially presented. But they should be considered in the light of certain limitations, which can in turn lead to some future directions.

First, our main focus was on individual achievement. In fact, we used Portuguese and mathematics grades, as well as GPA, as indicators of students’ academic achievement, and as discussed before, these are individual-level indicators that seem to be mainly dependent on individual efficacy for performance, rather than on class conjoined efforts and efficacy. This kind of study enables us to understand achievement at the individual level, but does not allow to further explore and compare individual and collective performance situations. Accordingly, it would be interesting to conduct wider comparative studies, which incorporate both individual and collective academic tasks and achievement indicators (i.e. both students’ GPA and GPA of the whole class), along with individual and collective efficacy beliefs. At the same time, perceptions students have about the level of interdependence required to successfully perform the academic tasks may vary across individuals. For this reason, controlling for the perceived level of interdependence in future studies would contribute to better understanding how well collective efficacy beliefs can predict academic achievement in these settings.

Second, our two studies are cross-sectional and non-hierarchical, which limits the extension to which the causal links between efficacy beliefs and achievement levels can be supported. Exploring the developmental and the hierarchical nature of individual and collective efficacy beliefs would be worth analysing, as it could bring more empirical evidence to the debate. For instance, longitudinal studies would offer a more comprehensive and richer view of individual and collective efficacy beliefs, allowing us to understand how they evolve throughout basic and secondary school, for the influence of these beliefs may vary across time. Similarly, studies using hierarchical linear models or multilevel analysis would offer a more accurate approach both to these two sets of efficacy beliefs, as they can be organized into an individual level and a collective level, and to the type of data that can be collected in academic settings, as students may be nested into classes and classes may be nested into schools. Moreover, considering that an integrated model gives a more comprehensive approach to students’ motivation and achievement, it may also be important to add other elements to the equation, this is, other variables beyond perceived efficacy but still related with it and that represent both individual and collective appraisals (e.g. the perceived competence, the class climate and the sense of belonging to the school). In the same way, it would be worth exploring the impact that teachers’ efficacy and teaching styles may have on students’ individual and collective efficacy beliefs.
Third, we should also take into account that Students Collective Efficacy Scale’s dimensions are not school subject domain-specific, as they do not refer to school subject tasks or domains, but to school situations and activities that are not subject domain-specific. SCES’s dimensions are not as microanalytic as Academic Self-Efficacy Scale’s dimensions, and this may explain to some extent why collective efficacy beliefs accounted for a smaller percentage of grades’ variance. Besides, the SCES needs further validation, given that it is a recently developed instrument, not yet proved to have a wide group of empirical evidences supporting its psychometric properties.

Finally, some gender and type of school moderating effects were found. These effects showed that boys and girls and that students from a public or a non-public school do not think the same way about their academic efficacy (both as an individual and as a group) and how this might affect their performance. Accordingly, future research should explore what particular aspects of being a boy or a girl or of attending a public or a non-public school may contribute to differentiating students’ self-beliefs, given that girls and students from non-public schools seem to be more focused on specific and individual aspects of their perceived efficacy, not so much related to collective efficacy appraisals. Acknowledging these gender and type of school differences might also be useful for more practical purposes, as we might better adequate specific psychological interventions, intending to promote students’ success and, ultimately, their well-being.

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Current themes of research:

Achievement motivation. Self-beliefs. Perceived competence. Academic achievement.

Most relevant publications in the field of Psychology of Education:

Pina-Neves, S., & Faria, L. (2009). Auto-conceito e auto-eficácia: Semelhanças, diferenças, inter-relação e influência no rendimento escolar [Self-concept and self-efficacy: Similarities, differences, interrelationship, and impact on academic achievement]. *Revista da Faculdade de Ciências Humanas e Sociais da UFP*, 6, 206–218.

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Current themes of research:
Motivation. Competence. Emotional intelligence. Psychological evaluation.

Most relevant publications in the field of Psychology of Education:

Ciochină, L. & Faria, L. (2009). Individualism and collectivism: What differences between Portuguese and Romanian adolescents. The Spanish Journal of Psychology, 12(2), 555–564.

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Current themes of research:
Social representations of intelligence and educability. Parental perceptions. School memories. Social and educational differences. Entrepreneurship education.

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