

## The Dark and Bright Sides of Self-Efficacy in Predicting Learning, Innovative and Risky Performances

Marisa Salanova<sup>1</sup>, Laura Lorente<sup>2</sup>, and Isabel M. Martínez<sup>1</sup>

<sup>1</sup>Universitat Jaume I (Spain)

<sup>2</sup>Universidad de Valencia (Spain)

The objective of this study is to analyze the different role that efficacy beliefs play in the prediction of learning, innovative and risky performances. We hypothesize that high levels of efficacy beliefs in learning and innovative performances have positive consequences (i.e., better academic and innovative performance, respectively), whereas in risky performances they have negative consequences (i.e., less safety performance). To achieve this objective, three studies were conducted, 1) a two-wave longitudinal field study among 527 undergraduate students (learning setting), 2) a three-wave longitudinal lab study among 165 participants performing innovative group tasks (innovative setting), and 3) a field study among 228 construction workers (risky setting). As expected, high levels of efficacy beliefs have positive or negative consequences on performance depending on the specific settings. Unexpectedly, however, we found no time  $\times$  self-efficacy interaction effect over time in learning and innovative settings. Theoretical and practical implications within the social cognitive theory of A. Bandura framework are discussed.

*Keywords: efficacy beliefs, learning performance, innovative performance, risky performance.*

El objetivo de este estudio es analizar el papel de las creencias de eficacia en la predicción del desempeño en situaciones de aprendizaje, innovadoras y arriesgadas. Nuestra hipótesis es que los altos niveles de autoeficacia en situaciones de aprendizaje e innovadoras tienen consecuencias positivas (es decir, un mejor desempeño académico e innovador, respectivamente), mientras que en situaciones de riesgo tienen consecuencias negativas (es decir, menor rendimiento en seguridad). Para lograr este objetivo, se llevaron a cabo tres estudios, 1) un estudio de campo longitudinal de dos tiempos con 527 estudiantes de pregrado (situación de aprendizaje), 2) un estudio de laboratorio longitudinal de tres tiempos con 165 participantes que realizaron tareas innovadoras en grupo (situación de innovación), y 3) un estudio de campo con 228 trabajadores de la construcción (situación de riesgo). Como era de esperar, los altos niveles de autoeficacia tienen consecuencias positivas o negativas en el desempeño en función de la situación o ambiente específico. Inesperadamente, sin embargo, no encontramos efecto de la interacción tiempo  $\times$  autoeficacia en situaciones de aprendizaje e innovadoras. Se discuten las implicaciones teóricas y prácticas de este estudio en el marco de la teoría social cognitiva de Albert Bandura.

*Palabras clave: creencias de eficacia, desempeño académico, desempeño innovador, desempeño de riesgo.*

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This research was supported by the Spanish Ministerio de Trabajo y Asuntos Sociales (#411/UJI/SALUD), the Spanish Ministerio de Ciencia e Innovación (#PSI2008-01376/PSIC), and the Universitat Jaume I & Bancaixa (#P11B2008-06).

Correspondence concerning this article should be addressed to Marisa Salanova. Department of Social Psychology, Universitat Jaume I. Av. Sos Baynat, s/n. 12071. Castellón (Spain). E-mail: [Marisa.Salanova@psi.uji.es](mailto:Marisa.Salanova@psi.uji.es)

Individuals and groups vary according their level of self- or shared confidence in their competences and skills to perform. Research shows that the higher efficacy beliefs, the higher performance at the individual and at the group levels of analysis (Bandura, 1997, 2001; Stajkovic, Lee, & Nyberg, 2009; Stajkovic & Luthans, 1998). The research question underlying this study is whether this influence is always positive or depends on the type of performance, attempting to discover if high levels of efficacy beliefs have also negative consequences (the dark side) on behaviors, depending on the type of activity performed, i.e. learning, innovative or risky activities. In order to answer our research questions, we put together in this paper the findings of three independent but still related studies: (1) The first was a longitudinal study conducted among undergraduate students (learning setting), (2) the second was a two-way longitudinal lab study on groups working on innovative tasks (innovative setting), and the (3) third was a field study of construction workers who display risky behaviors (risky setting).

*Efficacy beliefs: The power of believing that you can do it...*

Self-efficacy is related to “beliefs in one’s capacities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p.3) what can be individual or even feel experienced by groups and collectives as well.

Moreover, efficacy beliefs play a key role in human functioning because predict behavior through people goals and aspirations, outcome expectations, affective proclivities, and the perception of impediments and opportunities in the social environment. The centrality of efficacy beliefs in people life is crucial to understand and predict human behavior (Bandura, 1995, 1997). In short, efficacy beliefs have effects on the way people think and act, as well as on their feelings. Efficacy is thus related to human behavior and, hence, to performance. Efficacy beliefs influence decisions (selective effects), effort, and persistence (motivational effects) through self-regulatory mechanisms, and these mechanisms depend on the environment. Therefore, people with high levels of efficacy in a specific activity that they are performing feel involved and connected with it; they also feel that they are performing well. We will go on to examine this question in further detail in the following section.

*The negative and positive consequences of high self-efficacy on behavior*

Research has positively linked high levels of efficacy beliefs with intrinsic motivation (i.e. work engagement) and psychological well-being, at both individual and organizational levels. Particularly, Latham (2005) found positive relationships among self-efficacy, motivation, commitment and job performance. Xanthopoulou, Bakker,

Heuven, Demerouti, and Schaufeli (2008) and Xanthopoulou, Bakker, Demerouti, and Schaufeli (2009) revealed that work engagement mediates the relationship between self-efficacy and (in-role and extra-role) performance. Also, several studies have shown the relationship between efficacy beliefs and performance in different settings. In business management simulation, Tasa, Taggar, and Seijts (2007) showed that aggregated measures of teamwork behavior were related to subsequent efficacy beliefs, which were significantly related to final team performance. Decades of empirical research has given rise to a large number of studies that demonstrate positive relationships between job self-efficacy and different motivational and behavioral outcomes in a variety of settings (Stanjovic & Luthans, 1998, for a review). The reason for this is that when efficacy levels are high and individuals believe that they can control their environment effectively, they are more likely to perceive job demands as challenging, and that job and other personal resources are abundant. Consequently, individuals are also more likely to engage in their tasks and to perform well (Salanova, Schaufeli, Xanthopoulou, & Bakker, 2009).

To sum up, the above mentioned studies conclude that high levels of efficacy beliefs relate to positive and desired results, such as good academic or job performance, positive attitudes and satisfaction. But the question is: does this mean that the consequences of high levels of self-efficacy are always desirable? In other words, is the relationship between efficacy beliefs and performance always positive (i.e. the more self-efficacy, the better performance)? Or could these consequences be negative or not desirable under certain conditions?

We also have empirical evidence from some studies which showed negative consequences of self-efficacy on performance. For example, Stone (1994) discovered that high self-efficacy leads to overconfidence in one’s abilities. Instead of contributing more of their resources to the task, high self-efficacy individuals in fact contribute less. Whyte, Saks, and Hook (1997) postulated that self-efficacy may act as a source of inappropriate persistence; that is, the individual who has been successful in the past in those domains in which he/she displays high self-efficacy may develop overconfidence.

More recently Vancouver, Thomson, and Williams (2001) conclude that high self-efficacy creates relaxation and reduces future performance. In their longitudinal study with students, they found a significant and negative relationship between self-efficacy and subsequent performance (at the within-person level). That is, the more self-efficacy students had with regard to exams, the worse their performance was in later examinations over time.

Later Vancouver and colleagues (i.e. Vancouver & Kendall, 2006; Vancouver, Thompson, Tischner, & Putka, 2002) subsequently obtained more findings to support the idea that self-efficacy may have negative consequences on behavior.

In addition, Yeo and Neal (2006) studied the relationship between self-efficacy and performance in tasks that involve

learning, and indicate that the positive relationships between self-efficacy and performance are due to an error of analysis in the study. That is, they based their results on cross-sectional studies and only take into account effects between groups. Yet these negative effects of efficacy beliefs are evident in longitudinal studies where we observe *intra* changes *over* time. In relation to this, in Caprara et al.'s (2008) longitudinal study with Italian students, the perceived efficacy for self-regulated learning showed a progressive decline over time. However, the lower the decline in self-regulatory efficacy is, the higher the high school grades and the greater the likelihood of remaining at high school will be.

Contrary to all these reports of a negative effect of efficacy beliefs on performance, Bandura and Locke (2003) presented a large body of evidence that confirms that perceived self-efficacy and personal goals enhance motivation and various outcomes (work performance, psychosocial functioning, academic achievement and persistence, health functioning, athletic performance, experimental studies on performance, and group functioning, using collective efficacy), thus contradicting the previous studies findings. In this sense, Tierney and Farmer (2011), also found that enhance creative self-efficacy is related to higher levels of creative performance.

Therefore, some studies suggest that self-efficacy is related to negative results and others to positive. For this reason, this study aims to deepen the study of these relationships. Thus, we propose to analyze the relationship between self-efficacy and performance in different settings, because we think that the context of activity could be responsible for the sign of this relationship.

#### *When self-efficacy becomes overconfidence*

Finally, although discrepancies exist in the interpretation of the results of some previous studies, all of them refer to high levels of efficacy. But, to what extent can we talk about positive consequences of high efficacy? When and in what situations do these levels of efficacy become an excess of efficacy or overconfidence?

Bandura (1997) showed how an optimistic view raises the aspirations and maintains motivation, thus allowing people to take greater advantage of their talent and thereby contributing to psychological well-being and personal achievements. This indicates that an optimistic assessment of one's self-efficacy relates to positive results, but not an overly optimistic assessment, since an exaggerated sense of personal efficacy can "blind" a person when he/she faces some difficulties or risks, thus having negative effects. So, Bandura (1997) hypothesizes that people take risks and face challenges because they believe they are capable of coping with the situation. As a result, people with high self-efficacy may be less likely to fear failure and more likely to take reckless risks (Kontos, 2004).

In this regard, Llewellyn, Sanchez, Asghar, and Jones (2008) found in a study they conducted among mountaineers that climbers take calculated additional risks and they attempt harder climbs when they feel confident in their abilities and feel high self-efficacy. Hence, it appears that high self-efficacy could predict more risky behaviors. In relation to this, Bandura noted (personal communication, Stanford, October 2005) that efficacy beliefs have a different impact on performances that involve risks and activities than those which involve innovative behaviors and actions. In the former, the consequences of high self-efficacy may have negative consequences (lower safety performance). With the latter, however, high self-efficacy may have positive consequences (i.e. more innovative performance).

The current study tests these predictions and hypothesizes that high levels of self-efficacy may turn into overconfidence and may lead to negative consequences depending on the type of activity being performed. To our knowledge, no research has compared learning settings and innovative settings that demand creative or innovative outcomes as well as risky settings requiring responses to safety. On the one hand, therefore, this study investigates whether the consequences of efficacy beliefs depend on the type of activity being performed (i.e. learning, innovative or risky activities) and, on the other hand, whether there are significant differences between high and low self-efficacious people's learning and innovative behaviors over time. Specifically, we propose several hypotheses and they have been tested in the three different studies. We expect:

#### Study 1: Learning setting:

Hypothesis 1: Students with higher levels of self-efficacy at Time 1, report higher levels of academic performance at Time 2, than students with lower levels of self-efficacy. Hypothesis 2: The performance of students with higher levels of self-efficacy decreases over time compared with students with previous lower levels of self-efficacy. (This is an interaction effect of time  $\times$  self-efficacy on future academic performance, i.e. *intra*-level changes).

#### Study 2: Innovative setting

Hypothesis 3: Those participants and groups with higher levels of efficacy beliefs at Time 1 report more innovative behaviors at Time 1, Time 2 and Time 3, than participants and groups with lower levels of efficacy beliefs.

Hypothesis 4: The innovative behaviors of participants and groups with higher levels of efficacy beliefs decrease over time compared with participants and groups with previous lower levels of efficacy beliefs. (This is an interaction effect of time  $\times$  efficacy beliefs on future innovative behavior, i.e. *intra*-level changes).

### Study 3: Risky setting

Hypothesis 5: Construction workers with higher levels of self-efficacy report lower safety performance than workers with lower levels of self-efficacy.

Below, we describe the three studies conducted in order to achieve our objectives and to test our hypotheses.

### Study 1: A Learning Setting

#### Method

#### Participants and Procedure

A stratified sample of 867 students from the approximately 6,000 undergraduate students at the three faculties of a Spanish university was collected. The final study sample comprised 527 students: 67% females and 33% males. Participants were majoring in social and behavioral sciences (40%), chemistry and engineering (33%), and law (27%). All the study programs take four years to complete, and in our research we included one-year follow-up GPA (Grade Point Average) as performance measure. Therefore, only the students from the first (33.2%), second (42.9%) and third years (23.9%) participated in the research in order to get GPA scores one year later (T2). The mean age of the sample was 22 years and 6 months ( $SD = 2.6$ ; ranging from 18 to 43 years). Originally, 867 students completed the questionnaire, but 340 students did not indicate their identification numbers, so it was not possible to obtain their GPA scores. These students were excluded from the analyses presented in this study and, therefore, the final longitudinal sample was made up of 527 university students.

#### Variables

We specifically operationalized the self-efficacy construct in this study as *academic self-efficacy*, and we measured it with 5 items from the Spanish version of Midgley et al.'s (2000) scale, which reflects specific student beliefs about their future capacities to produce accurate levels of academic

performance in studying. One example item is: "*I will be able to do the more complicated work in class if I try hard enough*". We asked students to indicate the extent to which they agree with each sentence on a seven-point frequency-based rating scale (0 = *never*, 6 = *everyday*).

Performance was measured as *academic* performance with the students' objective GPA from the previous semester (i.e. previous performance) and for the following year (i.e. future performance). We obtained students' real GPA from university records. In the Spanish grading system, GPA scores range from 5 (*low*) to 10 (*high*).

#### Results

#### Descriptive Analysis

We calculated the means, standard deviations, internal consistencies (Cronbach's  $\alpha$ ) and inter-correlations of each variable. As can be seen in Table 1, the  $\alpha$  value for academic self-efficacy meets the .70 criterion (Nunally & Bernstein, 1994) and the more stringent .80 criterion (Henson, 2001). Moreover, the correlation between self-efficacy and past and future academic performance is significant and positive, i.e. the more self-efficacy there is, the better (past and future) performance will be.

#### Testing Hypotheses

We conducted an ANCOVA repeated measures analysis to check whether significant differences exist in academic performance between participants according to levels of self-efficacy, as well as intra-individual differences over time. Then, academic performance at T1 and T2 were included as dependent variables for the repeated measures test while self-efficacy was the covariable.

The results of the ANCOVA repeated measures tests reveal significant differences *between* participants,  $F(1) = 4241.01$ ;  $p \leq .001$ ;  $\eta^2 = .89$ , on different levels of efficacy beliefs. The higher the self-efficacy at T1, the better academic performance at T2, confirming Hypothesis 1. However, the interaction effect of time  $\times$  self-efficacy beliefs on performance is not significant (*intra*-individual changes over time), which does not support Hypothesis 2.

Table 1

Means ( $M$ ), standard deviations ( $SD$ ), internal consistencies, Cronbach's alpha, and correlations of the study 1 variables ( $N = 527$ )

|                                  | $M$  | $SD$ | $\alpha$ | 1      | 2     |
|----------------------------------|------|------|----------|--------|-------|
| 1 Past academic performance T1   | 6.58 | .74  | —        |        |       |
| 2 Academic self-efficacy T1      | 4.08 | 1.07 | .83      | .15*** |       |
| 3 Future academic performance T2 | 6.60 | .66  | —        | .75*** | .14** |

Note. \*\*  $p < .01$ . \*\*\*  $p < .001$ .

## Study 2: An Innovative Setting

### Method

#### *Participants and Procedure*

Study 2 is a three-wave longitudinal laboratory study in which 165 undergraduate university students voluntarily participated. The sample comprised 84% females and 16% males, who studied Psychology (70%) and Management and Business Administration (30%). First, we randomly assigned the participants into different working groups composed of four/five people each. When each group arrived at the social psychology laboratory, a researcher explained to the three tasks they have to perform with more instructions. All tasks were performed on the same day with two break periods of twenty minutes each (i.e., T1-break-T2-break-T3). The groups interacted over between five and six hours to conduct all the tasks. The first was to design “the University’s cultural week”. Each participant had to suggest five activities individually. Later all the activities were put together. Finally, the groups decided on the five most innovative activities from among all the individual proposals. When they had finished task 1, they completed a questionnaire with the study variables (Time 1 – T1). The second activity was to distribute the activities over one week and to design an original timetable for the different activities chosen in task 1. Then, they completed another questionnaire (Time 2 – T2). Finally, the third task was to design an original poster announcing the University’s cultural week. We explained to them that innovation and the creativity of the poster were the most appreciated points. When they had finished task 3, they completed another questionnaire with the study variables (Time 3 – T3).

#### *Variables*

*Efficacy beliefs* (i.e. self-efficacy and perceived collective efficacy). In this study we consider both individual and collective levels of efficacy beliefs. We measured self-efficacy at the individual level, and perceived collective efficacy at the group level with a self-constructed scale of five items, each of which is specific for innovative settings and follows Bandura’s recommendations for constructing efficacy beliefs scales (2001). One example of a self-efficacy item is: “*I’m sure I can think and propose creative ideas*” and an example of a perceived collective efficacy ( $\alpha = .93$ ) item is: “*My group can find original solutions*”. We used an eleven-point frequency rating on a Likert scale, ranging from 0 (*I/My group cannot do this at all*) to 10 (*I am totally convinced I/my group can do this*) to answer the five items.

*Self-reported Innovative Performance.* Pearce and Porter (1986) and Li-Ping, Baldwin, and Frost (1997) employed a self-reported rating in their studies by asking employees: “*What was your annual performance appraisal rating last*

*year?*” In a similar way, in the present study, self-reported innovative performance was measured at both the individual and collective levels with a self-constructed scale, each made up of three items. Example items are: “*I’m satisfied with my inputs because they have been innovative*” (Individual performance), and “*My group has taken new initiatives*” (Collective performance). We used a 7-item Likert frequency scale, ranging from 0 (*nothing/never*) to 6 (*always*), to answer the items.

### Results

#### *Preliminary Data Analysis*

Before starting the data analyses, we tested the within-group agreement in collective efficacy and collective behavior because it is important to match the level of analysis between the variables being studied (Chan, 1998; Kozlowski & Klein, 2000; Rousseau, 1985). Therefore, we tested within-group agreement of both innovative collective efficacy and innovative collective self-reported performance by computing  $r_{wg}$  using the Agree program (James, Demaree, & Wolf, 1993).  $R_{wg}$  values indicate whether the referent-shift consensus on collective efficacy and collective behavior judgments exists. High mean  $r_{wg}$  values indicate consensus or agreement between the group members, which suggests the sharing of these individual perceptions (see Arthur, Bells, & Edwards, 2007).

All the groups reached a within-team agreement in both collective efficacy beliefs and collective self-reported performance. The average  $r_{wg}$  value of the referent-shift consensus of the collective efficacy judgments was .77, while the average  $r_{wg}$  of collective performance was .91. These results suggest that we should not eliminate any of these groups because of the agreement reached in both the collective variables.

#### *Descriptive Analysis*

Given the high correlations among the variables, the common method variance bias was also considered (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). Thus, we applied Harman’s single-factor test with Confirmatory Factor Analyses (CFA; e.g. Iverson & Maguire, 2000) for the variables. The results reveal a poor fit to the data ( $\chi^2 = 896.23$ ;  $p = .001$ ; RMSEA = .21; GFI = .55; CFI = .65; IFI = .65). Then we compared this model with another competitive model with four latent factors (the two variables measured at both the individual and collective levels) and results reveal a significantly higher fit of the model to the data ( $\chi^2 = 356.85$ ;  $p = .001$ ; RMSEA = .12; GFI = .80; CFI = .90; IFI = .90), than the one single factor model, Delta  $\chi^2(6) = 539.38$ ,  $p < .001$ . Hence, one single factor cannot account for the variance into the data; we cannot consider the common method variance to be a serious deficiency in this dataset.

We then calculated the means, standard deviations, internal consistencies ( $\alpha$ ) and inter-correlations of each variable. As Table 2 shows, all the Cronbach's alpha values meet the .70 criterion (Nunnally & Berstein, 1994), and the more stringent .80 criterion (Henson, 2001). We checked whether group size (i.e. with four or five members each group) influences either collective efficacy or innovative self-reported performance. The ANOVA test results show no significant differences in terms of group size (i.e. four or five members to each group). Moreover, the correlation between efficacy beliefs and innovative performance is positive and significant in both cases.

### Testing Hypotheses

We conducted an ANCOVA repeated measures analysis to check whether there are any significant differences in innovative behaviors between participants with different levels efficacy beliefs and intra-individual differences among the three time points (T1, T2 and T3). We performed this analysis at both the individual and collective levels separately. Performance at T1, T2 and T3 were included as dependent variables for the repeated measures test while efficacy beliefs at T1 were the covariable.

The results of ANCOVA repeated measures tests reveal significant differences at the individual,  $F(1) = 119.512$ ;  $p < .001$ ,  $\eta^2 = .42$ ; and at the group  $F(1) = 136.97$ ;  $p < .001$ ,  $\eta^2 = .46$ , regarding levels of efficacy beliefs. The higher the efficacy beliefs, the more innovative performance at the three time points, thus confirming Hypothesis 3. However, the interaction effect of time  $\times$  efficacy beliefs on innovative performance is not significant (*intra-*

individual changes over time), in both levels of analysis, and it does not support our Hypothesis 4.

## Study 3: A Risky Setting

### Method

#### Participants and Procedure

The third study is a field study carried out in the construction industry. We chose this sector because it presents more risks. In fact, the European Foundation for the Improvement of Living and Working Conditions (2008) claims that the construction sector has one of the worst occupational safety and health records in Europe. The ILO (International Labor Organization) has also presented new data that show that 60,000 fatal accidents take place in the construction industry every year.

Therefore, first our research team contacted the key informants in the construction industry and different construction employers' associations. During these first contacts, we explained the study objectives and methodology to nineteen construction companies. Finally, 10 companies participated in the study. We used an interview guide designed by the research team to assess the work conditions in the construction industry that included open questions as well as a questionnaire with the study variables, which we handed out during the face-to-face interview with each construction worker. A total of 228 employees (100% men) from ten different Spanish construction companies answered the questionnaire. Ages ranged from 16 to 64 years old

Table 2

Means (*M*), standard deviations (*SD*), internal consistencie, Cronbach's alpha, and correlations of the Study 2 variables ( $N = 165$ )

|   | <i>M</i> | <i>SD</i> | $\alpha$ | 1     | 2     | 3     |
|---|----------|-----------|----------|-------|-------|-------|
| 1 Innovative performance self-efficacy T1       | 7.12     | 1.31      | .84      |       |       |       |
| 2 Innovative performance collective efficacy T1 | 7.41     | 1.56      | .93      | .38** |       |       |
| 3 Individual innovative performance T1          | 4.35     | .77       | .71      | .76** | .37** |       |
| 4 Collective innovative performance T1          | 4.81     | .75       | .70      | .40** | .70** | .45** |
| 1 Innovative performance self-efficacy T2       | 6.73     | 1.58      | .89      |       |       |       |
| 2 Innovative performance collective efficacy T2 | 6.87     | 1.72      | .93      | .34** |       |       |
| 3 Individual innovative performance T2          | 4.42     | .97       | .81      | .68** | .32** |       |
| 4 Collective innovative performance T2          | 4.58     | .91       | .85      | .42** | .69** | .50** |
| 1 Innovative performance self-efficacy T3       | 6.72     | 1.78      | .93      |       |       |       |
| 2 Innovative performance collective efficacy T3 | 6.84     | 1.87      | .94      | .41** |       |       |
| 3 Individual innovative performance T3          | 4.21     | 1.00      | .76      | .76** | .31** |       |
| 4 Collective innovative performance T3          | 4.47     | 0.93      | .85      | .32** | .71** | .48** |

Note. \*\*  $p < .01$ .

(mean age = 39.62,  $SD = 11.89$ ); 18% were foreigners and 35% had a temporary work contract.

### Variables

We specifically operationalized the *self-efficacy* construct in this study as risky performance self-efficacy and we measured it with a self-constructed 5-item scale which is specific for both the construction industry and the safety at work domains. The scale was designed following Bandura's recommendations (2001) and one example of an item is: "I can do my work well, although I don't use the protective equipment correctly". We used a 7-item Likert scale, ranging from 0 (*I cannot do this at all*) to 6 (*I am totally convinced I can do this*), to answer the items.

*Self-reported Performance* was measured in this study as safety performance with a self-constructed 3-item scale. One example of an item is: "I fulfill the security rules and instructions". We used a 7-item Likert frequency scale, ranging from 0 (*nothing*) to 6 (*always*) to answer the items.

## Results

### Descriptive analysis

We used Harman's single-factor test with Confirmatory Factor Analyses (CFA; e.g. Iverson & Maguire, 2000) for the variables to test the common method variance (Podsakoff et al., 2003) and the fit of the one-factor model to the data was poor ( $\chi^2 = 227$ ;  $p = .001$ ; RMSEA = .24; GFI = .75; CFI = .60; IFI = .60). Then we compared the one- and two factor (i.e. self-efficacy and safety performance) models and results reveal a significantly higher fit of the model with two-factors ( $\chi^2 = 116.1$ ;  $p = .001$ ; RMSEA = .17; GFI = .87; CFI = .81; IFI = .81), Delta  $\chi^2(1) = 110.9$ ,  $p < .001$ . Hence, one single factor cannot account for the variance in the data, the common method variance is not considered to be a serious deficiency in this dataset.

We calculated the means, standard deviations, internal consistencies ( $\alpha$ ) and inter-correlations of each variable (see Table 3). The Cronbach's alpha values meet the .70 criterion (Nunnally & Berstein, 1994), and the self-efficacy scale also meets the more stringent .80 criterion (Henson, 2001). The correlation between self-efficacy and safety performance is negative and significant.

Table 3

Means ( $M$ ), standard deviations ( $SD$ ), internal consistencies, Cronbach's alpha, and correlations of the study 3 variables ( $N = 228$ )

|                                  | $M$  | $SD$ | $\alpha$ | 1     |
|----------------------------------|------|------|----------|-------|
| 1 Risk performance self-efficacy | 2.99 | 1.60 | .83      |       |
| 2 Safety performance             | 4.84 | 1.07 | .72      | -.13* |

Note. \* $p < .05$ .

### Testing hypotheses

Finally, we performed an ANCOVA to test whether there are significant differences in safety performance (the dependent variable) in terms of self-efficacy levels (the covariable). The ANCOVA test results showed significant differences in safety performance regarding levels of self-efficacy,  $F(1) = 1.48$ ;  $p < .05$ ,  $\eta^2 = .21$ ). In this case, the higher the self-efficacy workers have, the lower safety performance they present (i.e. more risky behaviors). These results confirm Hypothesis 5, where we expected significant differences *between* high and low self-efficacious construction workers in safety performance.

## Discussion

Taking the Albert Bandura's SCT as its theoretical framework, the objective of this study was to analyze the different role that efficacy beliefs (i.e. self-efficacy and collective efficacy) play in the prediction of learning, innovative and risky performances. Our findings support Hypothesis 1, that is, the higher the self-efficacy in the learning setting is, the higher the academic performance will be; and Hypothesis 3, that is, the higher the efficacy beliefs in the innovative setting are (i.e. self-efficacy and perceived collective efficacy), the more innovative performances at both the individual and collective levels. Particularly, in these two settings, high efficacy beliefs relate to positive consequences, i.e. better academic and innovative performances, respectively. Furthermore, the results confirm Hypothesis 5 as well, that is, the higher self-efficacy in the risky setting is, the lower safety performance, which relates to negative consequences or dark side of self-efficacy, i.e. more unsafe behaviors. However, regarding *intra*-individual changes over time, we find no effect interaction effect of time  $\times$  efficacy beliefs in either academic performance or innovative performances. These results do not confirm Hypotheses 2 and 4 respectively. This may be due to the research design used. Possibly, study 2 (learning setting), should have more time points of data collection. In this way, we could have been able to analyze whether the high self-efficacy creates relaxation over time, as Vancouver et al. (2001) found. In study 2 (innovative setting), the research design has not

been sufficient and maybe longer periods of time are necessary, due to efficacy beliefs are quite stable psychosocial constructs and are needed longer periods of time in order to change over time.

### *Theoretical and Practical Implications*

The most relevant theoretical implication of the current study concerns the empirical evidence of the (different) consequences of high self-efficacy. These consequences are not always beneficial or positive for individual and groups – instead, they depend on the type of activity performed. The efficacy beliefs have a different impact on performances of activities that involve risk and activities that involve innovative or learning behaviors. From the beginning, this study has focused on the predictions of Bandura's SCT, which claims that human functioning is the product of the interaction between personal factors, behavior and environment, and that efficacy beliefs are the basis of personal and collective agency and influence one's motivation to engage in specific positive behaviors related to high performance. However, this study goes one step further by questioning whether this influence is always positive and findings show that the answer is “*the influence of efficacy beliefs in performance depends on the type of activity being performed*”.

In learning and innovative settings, for example, the most desirable behaviors are high academic performance and innovative performance. This result is very important in creative and learning contexts. High levels of efficacy are always related to a good performance. In these settings, the results confirm that having high levels of efficacy beliefs is more strongly related with academic performance and innovative performance.

The most desirable behavior in the risky setting is safety performance. The results also show that having high levels of efficacy for performing well (even assuming risky behaviors) relates to lower safety performance. Moreover, these undesirable behaviors may also have negative future outcomes, such as for example, occupational accidents. Therefore we could talk about “overconfidence” in some environments due to negative results (i.e. risky settings). Similarly, Powers (1991) argued that when performance levels are ambiguous (which could be the case of safety performance), self-efficacy inflates perceived performance levels, which decreases efforts and maybe also safety performance. This may be related with the idea which postulates that feeling confident about enacting performance and believing that enacting such behavior will result in better outcomes can motivate people to set realistic goals (Bandura, 1995). Yet, perhaps feeling “overconfident” can motivate people to set unrealistic goals. For this reason, overconfident people present lower safety performance or inappropriate behaviors, as Whyte et al. (1997) indicate. It may even be related with how overconfident people perceive

risks at work. Indeed, overconfident people may possibly perceive risks as being less dangerous. In this case the worker may develop risky behaviors that could be related to negative consequences (accidents).

However, in the learning setting, the results show that no *intra*-individual changes take place over time. These results neither support Hypothesis 2 nor agree with Vancouver and colleagues, who noted that efficacy beliefs in training or learning contexts have negative effects on learning performance (Vancouver & Kendall, 2006; Vancouver et al., 2001). They claim that high self-efficacy creates relaxation and reduces future performance, but only at the *intra*-person level (*intra* changes over time) because self-efficacy plays a practical and adaptive role, as well as a negative role in resource allocation. In a way, our results support the evidence presented by Bandura and Locke (2003) and show that efficacy beliefs predict the behavioral functioning between individuals at different levels of perceived self-efficacy. Although our results do not corroborate changes in individuals' functioning at different levels of efficacy over time, they support the SCT in that the performance of people with higher levels of self-efficacy does not become lower over time.

Finally, high levels of efficacy beliefs (i.e. self-efficacy and perceived collective efficacy) in innovative settings are “always” desirable. Bandura (1997) strongly suggests that self-efficacy is essential for innovative productivity. Furthermore, high efficacy beliefs in innovative settings are highly desirable because creativity and innovation are two characteristics that are highly valued by organizations in today's competitive world. In this study, we find significant differences in innovative performances *between* individuals and groups, but no *intra*-individual differences over time. These results may support the stability of the efficacy beliefs over time. Therefore, having high innovative self-efficacy does not predict lower innovative performance over time.

The practical implications of our study can be applied to learning contexts, creative and risky activities. This is important because in risky activities, high levels of self-efficacy or overconfidence could be undesirable. Practitioner can apply these findings for human resource management in order to prevent overconfidence and then potential occupational accidents at workplace.

### *Limitations and future research*

The most relevant limitations in this study concern the kind of information analyzed, since some measures are self-reports. One reason why the use of this kind of measure is considered to be a limitation is because many other factors may influence it. However, we used Harman's single-factor test, and the results reveal that we cannot consider the common method variance to be a serious deficiency in this dataset.



For further research, would be interesting to evaluate other indicators of academic performance (i.e., ratio of presented tests/approved tests) as well as more objective measures of job performance. We also could include other risk behaviors to test our hypotheses, like risk behavior when answering questions on a test that is penalized for incorrect answers. Moreover, it would be interesting to test our hypotheses in other settings, as well as other populations like firefighters (risky setting), or artists (innovative setting), as well as to analyze whether the consequences of efficacy beliefs on performance continue to be positive or negative depending on the setting where participants perform the activity. Finally, future longitudinal studies could analyze the effect of time  $\times$  self-efficacy, but with longer time intervals to explore intra differences over time.

### Final Note

The SCT background has tested the power of the relationship between efficacy beliefs and human performance in different settings. Main findings suggest that self-efficacy is effective but depends on the setting in which participants perform the activity in question. This is a serious challenge for research: to identify those settings in which self-efficacy can become overconfidence, in order to prevent it, and settings in which self-efficacy should be enhanced.

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Received February 28, 2011

Revision received September 5, 2011

Accepted September 15, 2011