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Patterns of engagement: the relationship between efficacy beliefs and task engagement at the individual versus collective level

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Abstract

This study examines the relationship between efficacy beliefs and task engagement in and over time, at both the individual and collective levels. We conducted latent growth curve analyses using data from 372 university students (individual level) who were assigned to one of 79 e-work groups (collective level). The participants carried out three collaborative tasks in a laboratory setting. Results reveal, at both levels, that the level of task engagement of participants and groups with high initial levels of efficacy beliefs remained stable, whereas the level of task engagement of participants and groups with low initial levels of efficacy beliefs decreased significantly over time. Moreover, the relationships linking the parallel constructs were functionally equivalent across levels. Theoretical and practical implications are discussed from the perspective of Bandura's social cognitive theory.

Past research has shown that efficacy beliefs and work engagement are strongly related (cf. Bakker, Albrecht, & Leiter, 2011; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009b). However, to date, the temporal dynamics of this relation have remained relatively understudied. As Bandura (1997) pointed out, efficacy beliefs provide people with a self-motivating mechanism that mobilizes effort to direct behavior toward goals and to increase persistence over time. Thus, it would be interesting to examine the temporal dynamics of two frequently studied constructs in occupational health psychology and to test if efficacy beliefs act as a trigger of engagement over time. To date, most longitudinal studies on the relationship between self-efficacy and engagement have used a time lag of several weeks to several months between measurements. Recently, some empirical work has studied tracking variation in work engagement from one day to the next (Sonnentag, 2003; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009a; Xanthopoulou, Bakker, Heuven, Demerouti, & Schaufeli, 2008).

Temporal matters are important in social psychology since we know that over time, employees change strategies for performing key tasks at work, and the communication patterns within work groups change (McGrath & Tschan, 2004). Studies on hour-to-hour fluctuations in work engagement—or efficacy—however, are still scarce. Thus, the present study fills this void by exploring the relationship between efficacy beliefs and task engagement over a 4 hour period. Moreover, we analyze this hour-to-hour fluctuations not only at the individual level but also at the collective level in a special type of group often used in today's organizations: virtual group.

Self-efficacy

According to the assumptions of the *social cognitive theory* (*SCT*; Bandura, 1997), efficacy beliefs, defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3), provide people with a self-motivating mechanism that mobilizes effort to target behavior toward goals and to increase persistence over time. Efficacy beliefs determine not only the amount of effort invested in facing obstacles, but also the amount of time and persistence in trying to achieve something. On the one hand, low levels of self-efficacy are associated with early withdrawal, while high levels involve effort and perseverance. On the other hand, efficacy beliefs also affect how we think and feel about ourselves. People who

consider themselves inefficacious in coping with environmental demands exaggerate the magnitude of their deficiencies and potential difficulties. These negative thoughts create stress and prevent available resources from being used. Conversely, people who perceive themselves as efficacious tended to focus their efforts on arising demands and strive to resolve these adequately (Bandura, 2001).

In short, people with high levels of efficacy beliefs perceive problems as challenges, highly commit to the activities they carry out, invest much time and effort in their activities, think strategically to solve difficulties, recover easily from failure or difficulty, feel they are in control of stressors, and feel they are less vulnerable to stress and depression (Bandura, 2001). Thus, efficacy beliefs play a key role in the self-regulation of motivation as they determine goal setting, effort, perseverance, and resilience to failures. This suggests that efficacy beliefs will also affect the level of engagement, as they affect the energy and persistence in the face of demands and the fulfillment of personal needs and job identification.

Engagement

Work engagement is "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (Schaufeli, Salanova, González-Romà, & Bakker, 2002, p. 74). *Vigor* refers to high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence in the face of difficulties. *Dedication* is characterized by a sense of significance, enthusiasm, inspiration, pride, and challenge. Finally, *absorption* is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work.

Within the engagement literature, there are several conceptualizations of the construct. According to Bakker et al. (2011), a differentiation between trait engagement (i.e., an affective cognitive state that is relatively stable across time) and state engagement (recommended to be measured daily, in order to look at daily changes in work engagement, so that we can better capture the dynamic and temporal aspects of engagement) must be made. Moreover, Schaufeli and Salanova (2011) went one step beyond and—in addition to these two kinds of engagement, which both focus on work, albeit from a different time perspective—conceptualized task engagement, which is focused on the specific task at hand.

Some previous studies have tested the relationship between engagement and self-efficacy. For instance, in a study among 353 Spanish and Belgian students, Salanova, Bresó, and Schaufeli (2005) showed that engagement acts like an injection of motivated behavior which stems from high levels of self-efficacy, that is, efficacy beliefs were significantly and positively related to students' levels of engagement. Similarly, Llorens, Schaufeli, Bakker, and Salanova (2007) reported that among groups of university students working on a computer task, high levels of self-efficacy led to high levels of energy and persistence in the face of demands (e.g., vigor) and fulfillment of personal needs and job identification (e.g., dedication) over time.

In a longitudinal study among Spanish secondary school teachers, Lorente, Salanova, Martínez, and Schaufeli (2008) found that self-efficacy significantly predicted work engagement over time. Likewise, Simbula, Guglielmi, and Schaufeli (2011) found, also among teachers, that self-efficacy had both a short (i.e., 4 months) and longer term (i.e., 8 months) lagged effect on work engagement. Along the same lines, Xanthopoulou et al. (2007, 2009b) reported that employees with high self-efficacy were also highly engaged both cross-sectionally and longitudinally. Their longitudinal study (Xanthopoulou et al., 2009b) further indicated that self-efficacy, organization-based self-esteem, and optimism all explain a unique proportion of the variance in work engagement over time when controlling for job resources. In his meta-analysis, Halbesleben (2010) stressed the importance of work engagement for organizations by showing that engagement related positively to organizational outcomes such as worker commitment, performance, and health, and related negatively to outcomes such as turnover intention. Moreover, compared to other job and personal resources, self-efficacy had the strongest relationships with work engagement. Thus, apparently self-efficacy is a key antecedent of work engagement.

Finally, and regarding task engagement, Spaulding (1995) found, in an academic setting, that self-efficacy had a significant effect on task engagement. As this author explained, when individuals' levels of self-efficacy are high, they set more challenging task-related goals for themselves, they feel better while working toward those goals, and they persist longer in their efforts to meet those goals. In the same line, Locke, Frederick, Lee, and Bobko (1984) found that only individuals with high level of perceived self-efficacy for a specific task accepted and committed themselves to self-set performance goals for that task.

The present study specifically explores the longitudinal relationship of efficacy beliefs with task engagement within a very short time frame (i.e., 4 hours). The aim is to determine the effect of specific efficacy beliefs regarding the performance of creative tasks on task engagement, rather than on general work engagement, in a longitudinal 4 hour process. Furthermore, we expect fluctuations in task engagement at each of the three measurement times, since participants performed different types of tasks and both self-efficacy and engagement were measured vis-à-vis each of these specific tasks rather than in general. Thus, the first objective of the present study is to investigate whether initial levels of efficacy beliefs relate to (a) initial levels of task engagement and (b) the development of task engagement over time. We hypothesize that:

Hypothesis 1a. High initial levels of self-efficacy are positively related to initial levels of task engagement.

Hypothesis 2a. High initial levels of self-efficacy are related to an increase in task engagement over time.

One step beyond: the collective level

One of the hallmarks of the changing nature of work is the increasing shift to teams as the organizing unit (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Although organizations are made up of individual employees, currently they often collaborate in the context of a work team, some of which are virtual. As the origins of group-level constructs lie in individual cognitions and behaviors, they will emerge as group members working together in an interactive task context (cf. DeShon et al., 2004). Group members develop shared perceptions of key regulatory constructs that refer to the collective level, and these constructs are linked by theoretical processes that are similar to the processes operating at the individual level. Thus, in order to understand the links between efficacy beliefs and engagement, we must consider these relations at both the individual and collective levels.

Moreover, the necessity to overcome space and time constraints that burden face-to-face meetings has created new opportunities and challenges for organizations to build and manage virtual teams. In this line, one major change observed in today's organizations is the implementation of information and communication technologies, which has triggered a new way of working, electronic work groups or e-groups (Salanova, Llorens, Cifre, Martínez, & Schaufeli, 2003), and their use is expanding exponentially (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002). Therefore, our second and third hypotheses are tested among individuals working in e-groups.

As regards efficacy beliefs (i.e., self-efficacy and perceived collective efficacy), the *SCT* extended the concept of individual causality of agency to collective agency through a feeling of shared efficacy (Bandura, 1997). Perceived collective efficacy is defined as group members' shared beliefs in their joint capacities to organize and execute the courses of action required to produce certain levels of attainment (Bandura, 1997). Bandura (1999) stressed that perceived collective efficacy is not simply the sum of the efficacy beliefs of individual members. Rather, it is an emergent group-level property.

It is important to point out that, although research has demonstrated that individual efficacy beliefs and collective efficacy beliefs can be related (Fernandez-Ballesteros, Diez-Nicolas, Caprara, Barbaranelli, & Bandura, 2002; Parker, 1994), an individual's beliefs in each of the forms of efficacy may differ. This means that whereas an individual might consider him/herself to be efficacious with regard to a specific task, he/she might consider the (work) group as a whole not to be so.

Salanova, Agut, and Peiró (2005) showed work engagement to be a motivational construct that is also shared by employees in the workplace. According to these authors, people working in the same group have more opportunities to interact with each other and, therefore, have more possibilities to become involved in both negative and positive psychological contagion processes (Bakker, Van Emmerik, & Euwema, 2006). Moreover, Pugh and Dietz (2008) provided several reasons for conceptualizing and studying employee engagement at the group and organizational levels. For example, they argue that if some of the possible antecedents and consequences of the engagement construct are at the team level of analysis, it is appropriate to conceptualize this construct at the corresponding level of analysis. Focusing on e-groups, Salanova et al. (2003) used and validated collective measures of both constructs: efficacy beliefs and engagement.

Taking into account that a growing body of research suggests that collective efficacy does for teams what self-efficacy does for individuals (Tasa, Taggar, & Seijts, 2007), we expected the same processes to operate on the collective level among e-groups, as on the individual level. We expect that:

Hypothesis 1b. High initial levels of collective efficacy beliefs are positively related to initial levels of collective engagement among e-groups.

Hypothesis 2b. High initial levels of collective efficacy beliefs are related to an increase in collective engagement over time among e-groups.

Moreover, the composition processes describe the convergence of similar lower level characteristics to yield a higher level property that is essentially the same as its constituent elements, and which is the basis for homologous multilevel models. These models specify that constructs and the processes linking them can be generalized across levels. For example, the relation between efficacy beliefs and task engagement should hold at both the individual and collective levels (cf. Kozlowski & Klein, 2000). As we assume that the relations between efficacy beliefs and task engagement at the individual and collective levels are based on similar theoretical processes, we expect:

Hypothesis 3. The theoretical processes linking efficacy beliefs and task engagement are functionally equivalent at the individual and collective levels.

Method

Participants and procedure

A three-wave study was conducted in a laboratory setting among 372 Spanish participants enrolled in university

studies (83% female). Study participation was voluntary. Participants were randomly assigned to one of 79 e-groups (i.e., electronic work groups) of four or five members each. The e-groups carried out three tasks in a laboratory setting with an intranet connection and five work stations on which the Moodle online collaboration software system (Dougiamas, 2007) was installed. The Moodle system allowed participants to communicate online synchronously with the other members of their work groups and provided a forum where they could upload and download all the materials they required to perform the three tasks. e-Group members were seated in separate offices. During the tasks, they could only communicate with each other by means of a computer: Any direct or personal contact was avoided. All participants received the same information about the study. Before the first session, the first author trained the participants in using Moodle.

All participants were informed that their e-groups belonged to the sociocultural task force of their university. The main objective of this service was to develop and promote a project about sociocultural activities. The group's mission was threefold. First, the group had to develop the official program for the so-called cultural events week at the university (Task 1). Second, they had to develop the timetable for this particular week (Task 2). Finally, they had to design the posters that would be used to promote the cultural events week (Task 3).

Thus, the e-groups carried out three creative and innovative tasks. Moreover, according to Quinn's (2005) classification—making a distinction between intellectual, physical, and social tasks—participants performed mostly intellectual tasks. More specifically, in Task 1, participants first worked individually, developing their own ideas about five possible activities to be performed in the cultural week, that is, they had to think on their own about five activities. They would then work as an e-group by pooling all the activities and choosing the ten activities considered the most appropriate for the cultural week. So, they had to agree about which ten activities were the better ones. In this task, they were informed that originality and feasibility would be valued. In Task 2, participants had to schedule these ten activities on a weekly timetable that ran from Tuesday to Friday, taking into account what day and what time would be most favorable for the proposed activities. Finally, in Task 3, the e-group had to design the poster for the cultural week. This poster would be used to promote the cultural week, and would be posted at the university and in certain areas of the city. In this task, the originality of the poster design was valued. They had to decide on the format and the information of the poster announcing the sociocultural week. All three tasks were done in 4 hours, at the same time of the day, with short breaks in-between the tasks. As the nature of breaks has been shown to have effects on behaviors and emotions (Fritz, Lam, & Spreitzer, 2011), it could be possible that the nature of breaks could have an effect on engagement. Thus, it is important to note that during both breaks, the study participants had to stay in a room where one of the researchers was also present. So, we can assume that there are no contextual aspects affecting only some of the participants and not others. Therefore, the nature and duration of the breaks were kept constant (and controlled) for all groups. According to Loehr and Schwartz's (2003) categorization, students mainly used physical strategies during these breaks in order to fulfill basic physiological needs such as drinking water, going to the bathroom, or smoking.

Although all three tasks performed in this study required creativity, they were three separate tasks with different objectives and different rules for evaluation. The study variables were measured on three occasions, namely immediately after completion of each task. Students were asked to think about the specific task they had just finished when completing the questionnaires about efficacy beliefs and task engagement. Finally, note that this cultural week actually takes place each year at the participants' university and that students often participate in its organization. So, the study tasks were entirely plausible for them.

Instruments

Self-efficacy was measured with five self-constructed items. According to Bandura (2006), the use of general and nonspecific self-efficacy scales makes little sense, and he argued that it is futile to measure self-efficacy with a general scale because items based on the general efficacy approach are largely irrelevant for the domain under study. Therefore, following Bandura's guidelines for constructing self-efficacy scales, we constructed a domain-specific scale for our study. First, we focused on behavioral factors, that is, the activity domain over which people can exercise some control, to specifically measure self-efficacy to perform creative and innovative tasks. Since in each session participants performed a different creative task, we created a specific scale that was still general enough to be used in all three sessions. Five items were formulated, all starting with "I am confident that I can . . . ," followed by (1) *organize and plan several activities together with my work group*; (2) *distribute the time properly*; (3) *think and propose creative ideas*; (4) *find original solutions to problems*; and (5) *propose viable and realistic solutions*.

Perceived collective efficacy to perform creative and innovative tasks was measured with the same five self-constructed items that were created for measuring specific creative and innovative self-efficacy, but in this case the reference was the group and the items began with the stem: "My group can. . . . " Following Bandura's recommendation, the items of both scales were scored using an 11-point Likert format (0 = *not at all confident*, 10 = *totally confident*). Previous studies

(Bandura, 2006) have demonstrated that this procedure results in reliable and valid scales to measure self-efficacy.

Task engagement was measured with a validated adaptation (Salanova et al., 2003) of the Utrecht Work Engagement Scale (Salanova, Schaufeli, Llorens, Peiró, & Grau, 2000; Schaufeli, Salanova, González-Romà, & Bakker, 2002) where the items were reworded to refer to (specific) task engagement instead of (general) work engagement. Vigor was measured by seven items (e.g., *During the task, I felt full of energy*), dedication was measured by five items (e.g., *I was involved in the task*), and absorption was measured with seven items (e.g., *Time flew when I was working on the task*). *Collective engagement* was measured in a similar way as task engagement, but referred to the group's level of engagement. Vigor was measured by seven items (e.g., *The group has been strong and vigorous during the task*), dedication was measured by five items (e.g., *The group was enthusiastic about the group task*), and absorption was measured with seven items (e.g., *The group found it difficult to disconnect from the task*). All scales were scored using 7-point Likert scales (0 = *never*, 6 = *always*). For both the individual and the collective measures, the scores for the 19 items were averaged for each time point, yielding single scores for engagement.

Data analyses

This is a multilevel study as individual observations were nested within teams (the collective level). For the analyses concerning the associations among collective efficacy and collective engagement, individual-level data were used to establish the team-level construct. Following Chan's (1998) typology of composition models, we used the referent-shift consensus model. So, we conceptually defined and operationalized the constructs at the lower level (i.e., self-efficacy and task engagement) and then we shifted the referent (i.e., changed "I" for "we"). Moreover, both constructs were aggregated to higher level constructs based on within-group consensus. In order to verify if the group members in our sample agreed to a great extent on the variables under study (i.e., to verify the consensus among them), we computed several within-group consensus indicators: the $r_{wg(J)}$ index of within-group agreement (James, Demaree, & Wolf, 1984) and the intra-class correlation coefficient ICC(1) (Bliese, 2000). The $r_{wg(J)}$ values for our measure of collective efficacy beliefs were high at Time 1 with an average value of .82. With regard to collective task engagement, the $r_{wg(J)}$ values were also high at all three times, with an average value of .87 for Time 1, .85 for Time 2, and .82 for Time 3, indicating substantial agreement among team members at all three occasions. The ICC(1) of collective efficacy beliefs at Time 1 was .09, $F(78, 293) = 1.46$, $p < .05$, whereas the ICC(1) for collective task engagement was .25, $F(78, 293) = 2.53$, $p < .001$, at Time 1; .25, $F(78, 293) = 2.54$, $p < .001$, at Time 2; and .20, $F(78, 293) = 3.11$, $p < .001$, at Time 3. As group membership explained a significant part of the variance in the responses on the collective-level measures (Bliese, 2000), aggregation of the respective individual responses to the collective level was warranted.

Preliminary repeated measures analysis of covariance with individual-level self-efficacy as a covariate, the three measures of individual-level engagement as a within-participants factor, and team membership as a random factor did not reveal significant main or interaction effects involving team membership. Thus, the multilevel structure for this part of the data could be ignored, meaning that single-level approaches were appropriate for analyzing the data. To test the study hypotheses, we used an extension of McArdle's (1998) level and shape (LS) model (which is also often referred to as growth curve modeling or latent change analysis) to test whether the development of task engagement over time varied in terms of the initial levels of efficacy beliefs. This approach focuses on the development of task engagement during the study and relates this development to the level of efficacy beliefs as measured when it started. Regarding task engagement, the LS model distinguishes between a level factor (representing the individual-level scores on task engagement at the beginning of the study) and a shape factor (representing the rate of change in task engagement during the study). The means of these factors are interpreted as the individual-level true scores at the start of the study (for the level factor) and the rate of change during the study (for the shape factor: e.g., a negative value for this factor would indicate a decline in task engagement during the study period; Raykov & Marcoulides, 2006). Furthermore, the level and shape factors were allowed to correlate to account for the fact that the rate of change in task engagement could be contingent upon initial status. Finally, both the level and shape factors were related to efficacy beliefs, as measured at the beginning of the study. These effects correspond with our hypotheses that high levels of efficacy beliefs would positively relate to initial levels of task engagement (Hypotheses 1a and 1b) and to an increase in engagement during the study interval (Hypotheses 2a and 2b). These hypotheses were tested at both the individual ($n = 372$) and the collective ($n = 79$) level, that is, separate analyses were conducted for each level.

Finally, we performed an additional two-group analysis to examine whether the corresponding individual-level and collective-level structural effects could be constrained to be equal. If this were the case, it would suggest that the processes connecting efficacy beliefs and engagement at the individual versus the collective level would be basically the same at both levels (Hypothesis 3).

All the models were estimated using the LISREL 8.30 program (Jöreskog & Sörbom, 1999). Model fit was evaluated by inspecting the chi-square test, the nonnormed fit index (NNFI), the root mean square residual (RMSEA), and the

Table 1 Descriptive Statistics for the Study Variables, for the Total Group, and as a Function of Low versus High Individual ($n = 206$) and Collective ($n = 39$) Efficacy

				Low efficacy		High efficacy							
	M	*SD*	α	*M*	*SD*	*M*	*SD*	2	3	4	6	7	8
1. Self-efficacy T1[a]	7.12	1.31	.84					.41***	.30***	.33***			
2. Task engagement T1[a]	4.30	.69	.91	3.94	.75	4.60	.59		.50***	.48***			
3. Task engagement T2[a]	4.15	.92	.95	3.74	.92	4.44	.90			.66***			
4. Task engagement T3[a]	4.04	1.02	.96	3.54	1.01	4.42	.84						
5. Collective efficacy beliefs T1[b]	7.48	.73	.93								.71**	.64**	.57**
6. Collective task engagement T1[b]	4.62	.44	.96	4.19	.49	4.93	.33					.73**	.67**
7. Collective task engagement T2[b]	4.31	.55	.97	3.88	.58	4.77	.32						.81**
8. Collective task engagement T3[b]	4.20	.67	.98	3.72	.63	4.78	.40						

[a]Individual-level construct, $n = 372$.
[b]Collective-level construct, $n = 79$.
*$p < .05$. **$p < .01$. ***$p < .001$.

comparative fit index (CFI). Values of .90 and higher (for CFI and NNFI) and of .08 or lower (for RMSEA) present acceptable fit (Byrne, 2009).

Results

Descriptive analyses

Means, standard deviations, reliabilities, and correlations between the variables are presented in Table 1. This table shows that all correlations were significant and in the expected direction. However, contrary to our expectations, levels of both individual and collective task engagement showed a decline over time. In addition, we also present the means of engagement across time for these low (i.e., $M - 1$ *SD*) versus high (i.e., $M + 1$ *SD*) efficacy individuals and groups. As this clearly shows, task engagement is higher and more stable for the high efficacy beliefs group, both at the individual and the collective level.

Structural equation analyses

Individual-level analysis

The individual-level model fitted the data acceptably well: chi-square ($n = 372$, $df = 3$) = 6.18, RMSEA = .05, NNFI = .98, CFI = .99. Figure 1 presents the findings graphically. The mean score for the level factor was 4.31 ($p < .001$). The mean score for the shape factor was negative and significant (−.25, $p < .001$), showing that individual-level task engagement declined slightly over time. So, it seems that participants' levels of engagement were decreasing over time. Moreover, the covariance between the level and shape factors was significant (a standardized effect of .87, $p < .05$), meaning that the over-time task engagement scores of those participants who reported high initial levels of task engagement were higher than those of participants reporting low initial levels of task engagement. As the scores on individual-level task engagement declined over time, the positive association between the level and the shape factors means that this decline was weaker for those reporting high initial levels of task engagement than for others.

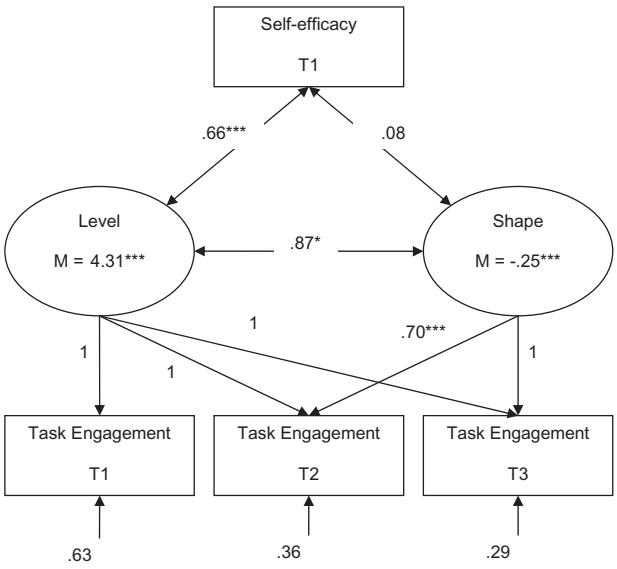

Figure 1 Individual-level findings ($n = 372$) for a structural equation analysis of the associations among efficacy, initial levels of task engagement (level), and the over-time development of task engagement (shape). Structural parameters are standardized to facilitate interpretation.

We found a positive association between Time 1 self-efficacy and the initial level of task engagement (a standardized effect of .66, $p < .001$). Thus, high initial levels of self-efficacy predict high initial levels of task engagement (Hypothesis 1a supported). The direct association between Time 1 self-efficacy and the over-time change in task

engagement was not significant (a standardized effect of .08, $p > .05$). Thus, although self-efficacy did indeed positively associate with task engagement, self-efficacy was indirectly (via the association between the level and shape factors), rather than directly, associated with the over-time change in task engagement (Hypothesis 2a not supported). Since the level of task engagement of our participants decreased rather than increased over time, Hypothesis 2a was not supported. However, these results show that in a process of loss of task engagement, participants with high initial self-efficacy are capable of maintaining their levels of engagement, whereas those with low levels of self-efficacy tend to become less engaged during the task. That is, the pattern of findings suggests that high levels of self-efficacy foster high initial levels of engagement, and participants with high initial self-efficacy are capable of maintaining their levels of engagement, whereas those with low levels of self-efficacy tend to become less engaged during the task.

Collective-level analysis

Most of the collective findings were similar to those obtained for the individual level. The collective model fitted the data well: chi-square ($n = 79$, $df = 3$) = 2.77, RMSEA = .000, NNFI = 1.00, CFI = 1.00. Figure 2 presents the findings. The mean score for the level factor was 4.61 ($p < .001$), showing that on average the Time 1 score of the groups on collective engagement was already close to the maximum score of 6. Similar to the individual-level data, the mean for the collective-level shape factor was negative and significant (−.43, $p < .001$), indicating that collective engagement declined over time. Finally, the association between the level and shape factors was significant (a standardized effect of .50, $p < .05$), meaning that the over-time collective engagement scores of the groups in which the participants reported high initial levels of collective engagement were higher than those of groups for which low initial levels of collective engagement were reported. This decline was lower for the groups reporting high initial levels of collective engagement than for other groups, as shown by the positive association between the level and the shape factors.

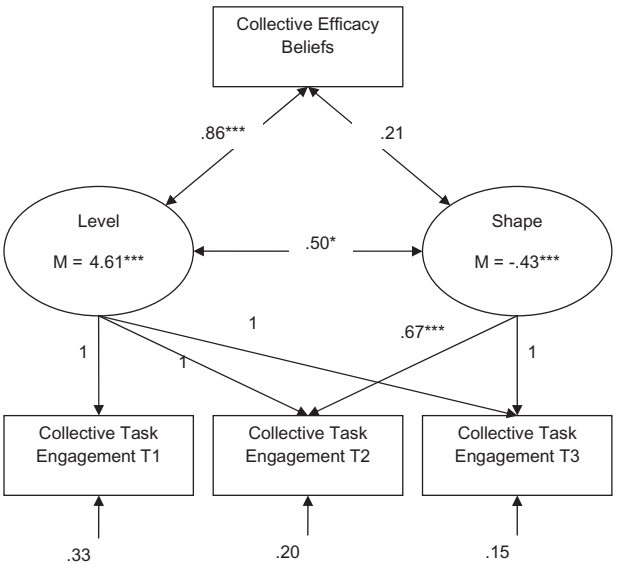

Figure 2 Collective-level findings ($n = 79$) for a structural equation analysis of the associations among efficacy, initial levels of task engagement (level), and the over-time development of task engagement (shape). Structural parameters are standardized to facilitate interpretation.

Furthermore, we found a positive association between Time 1 collective efficacy beliefs and the initial level of collective task engagement (a standardized effect of .86, $p < .001$). Thus, high initial levels of collective efficacy beliefs related to high levels of initial collective engagement (Hypothesis 1b supported). However, the direct association between Time 1 collective efficacy beliefs and the over-time change in collective engagement was not significant ($p > .05$), but the indirect association was significant (Hypothesis 2b not supported). These findings mirror what was found for the individual-level data. Again, those participants with high collective efficacy beliefs reported a higher initial level of collective engagement, while those with high initial levels of collective efficacy beliefs were more successful at maintaining this affective state than participants with low initial levels of collective efficacy beliefs.

Comparison of individual-level and collective-level findings

As a final step in our analyses, we examined whether the corresponding individual-level and collective-level structural effects (i.e., the associations between efficacy and the level and shape factors) could be constrained to be equal. If so, this would suggest that the processes connecting efficacy beliefs and task engagement at the individual versus the collective level would be basically the same at both levels (Hypothesis 3; cf. DeShon et al., 2004). To this purpose, we performed an additional two-group analysis in which we first estimated a model in which these parameters could vary freely across groups. The fit of this model was then compared to that of a second model in which all the corresponding parameters were set equal. Comparison of the fit of these models indicates whether it is reasonable to assume that the two sets of findings are the same.

The unconstrained model yielded a chi-square value ($df = 6$, $n = 451$) = 8.96 whereas the model in which the corresponding structural parameters were set equal yielded a chi-square value ($df = 9$, $n = 451$) = 17.82. The difference between both chi-square values was significant, delta chi-square ($df = 3$, $n = 451$) was 8.85, $p = .03$, meaning that

Hypothesis 3 had to be initially rejected. However, further analysis revealed that this was due to the fact that the association between the level and shape factors was stronger for the individual-level data (a standardized effect of .87, $p < .001$) than for the collective-level data (a standardized effect of .50, $p < .05$). Therefore, as the associations between efficacy beliefs and the level and shape factors were basically the same for both the individual and collective levels, the relations linking the parallel constructs were functionally equivalent across levels and met the assumption of multilevel homology (DeShon et al., 2004).

Discussion

This paper addressed the temporal dynamics of two often-cited constructs in occupational health psychology, that is, self-efficacy and engagement, over a 4 hour period of task execution. More specifically, we examined whether efficacy beliefs trigger engagement during a relatively short time span. Using growth curve modeling, this multilevel study demonstrated that (a) individuals with high initial levels of self-efficacy had high initial levels of task engagement, and (b) efficacy beliefs were associated with over-time change in engagement indirectly rather than directly. High initial levels of efficacy beliefs acted as a resource that protected against major losses of engagement in later stages of the task being conducted. Conversely, low initial levels of efficacy beliefs were associated with substantial and significant decrements in engagement during task execution. In conjunction, these findings strongly demonstrate that high efficacy beliefs benefit the development and maintenance of task engagement.

A small body of research has shown that efficacy beliefs and task engagement are positively related. Based on the results of recent longitudinal studies (Xanthopoulou et al., 2007, 2009b), it seems reasonable to conclude that high efficacy beliefs can foster levels of engagement. This agrees with Bandura's (1997, 2001) *SCT* that assumes that high efficacy beliefs are related to motivation and act as a self-motivating mechanism: If people perceive their own levels of competence to be high, they set themselves challenging goals and are motivated to spend considerable efforts and show persistence in overcoming obstacles. The present study supports and expands these insights, showing that efficacy beliefs affect the development of engagement over a very short time span, and individually as well as collectively among e-groups.

Recently, virtual groups have attracted the attention of organizational researchers (Kirkman & Mathieu, 2005). e-Groups have become a necessity since organizations increasingly face high levels of dynamic, complex change and environmental uncertainty, and virtual teams can rapidly respond to business globalization challenges (Kayworth & Leidner, 2001; Maznevski & Chudoba, 2000; Montoya-Weiss, Massey, & Song, 2001). Therefore, in this paper, we decided to study virtual teams in order to relate individual as well as collective efficacy beliefs with work engagement during a 4 hour period of task completion. In order to study the collective level, we followed Chan's (1998) typology of composition models. These models are based on the premise that lower level phenomena are isomorphic with the higher level construct. Our findings for the individual and collective levels were indeed very similar. Similar to individual participants, work e-groups with high levels of perceived collective efficacy reported high scores on initial collective engagement. These e-groups also showed high and stable collective engagement levels over time, whereas e-groups with low initial perceived collective efficacy declined in collective engagement over time. Thus, although the association between the initial level of task engagement and the over-time task engagement scores was stronger at the individual level than at the collective level, the associations between efficacy beliefs and the level and shape factors were basically the same at both levels. This is because the collective-level scores are aggregated over different individuals and may include slightly different trends over time, whereas at the individual level both the initial scores and the over-time scores were obtained from the same person. Despite this difference, the apparent similarity across levels supports our expectations that the regulatory processes at both levels (individual and collective) are isomorphic and that linkages between similar constructs are functionally equivalent across levels. That is, the constructs at the collective level are analogous to, and the theoretical mechanisms linking them are similar in nature to, the individual-level constructs (Kozlowski & Klein, 2000).

Contrary to our expectations, our results showed that our study participants were in a demotivational rather than a motivational process, as their overall scores for task engagement lowered over time both individually and collectively. This might explain why those individuals and e-groups with high efficacy beliefs remained stable as regards their levels of task engagement over time, and did not show the expected increase in task engagement. This decline in motivation could be due to factors such as low intrinsic motivation for the task, which may have become boring for the participants over time. Still, the importance of efficacy beliefs for engagement was clearly visible in this process, as these beliefs buffered against the decline in task engagement over time. This effect can be observed clearly in Table 1, showing that individual and e-groups with high initial levels of efficacy beliefs report higher and more stable values in task engagement over time than the e-groups with low initial levels of efficacy beliefs.

The distinction between a main effect model versus a buffering model is not new to the literature, especially in the literature on social support (i.e., Lee et al., 2006; Patterson, 2003). Though our hypotheses were focusing on the main effect of efficacy beliefs, our—unexpected—results showed

an important alternative effect: the buffering effect. Future studies could aim at uncovering the conditions under which efficacy has a main effect versus a buffering effect on engagement. In that line, several earlier studies have shown a similar buffering role of efficacy beliefs, although they mainly focused on efficacy beliefs as a resource to cope with stressful circumstances. Specifically, Hulbert and Morrison (2006) recommended worksite interventions that target caregiver self-efficacy and optimism as a potential stress management resource for people working in palliative care. Similarly, Marlowe (1998) found that the relation between stressful events and headache was stronger for those subjects with low self-efficacy and became progressively weaker as self-efficacy increased. Within the area of work and organizational psychology, Xie (2007) studied the effect of self-efficacy on stressor–strain relationships among interviewers. He found that after 30 telephone interviews, perceived social efficacy affected the stressor–strain relationship; the number of refusals (stressors) was psychologically less threatening for the interviewers with high levels of perceived social efficacy than for those with low levels of perceived social efficacy. Finally, Salanova et al. (2003) reported how high levels of perceived collective efficacy buffered the negative effects of time pressure on collective engagement and task performance in e-groups. Thus, the findings of these previous studies are consistent with the notion that high levels of individual and collective efficacy may buffer the adverse effects of stress and strain on a range of outcomes.

The present study extends these findings by showing (a) that this buffer effect also operates in a demotivational process, (b) that similar processes operate at individual and collective levels, more specifically in e-groups, and (c) that these processes can be demonstrated longitudinally, providing evidence for the causal nature of this effect.

Limitations and future research

The main limitations of this study are the following. First, although we had expected engagement to increase during the study (especially for those participants with high levels of efficacy), we found a *dis*engagement process in our study. This could be due to a task that may have been not interesting enough to sustain participants' motivation, and could have been aggravated by the fact that—as the participants were promised a reward for good performance—their motivation for the task may have been extrinsic rather than intrinsic: The participants were in the task because they expected to earn study credits, not because they felt the task was interesting or motivating. Given these adverse circumstances, it is noteworthy that a relatively high level of self-efficacy was still associated with a relatively low decrement in engagement, which is consistent with our expectation that high self-efficacy would be beneficial for engagement. In sum, one contribution of our findings is that they demonstrate that efficacy beliefs can buffer the decline in motivation over time, showing that efficacy beliefs are an important motivational factor.

A second limitation derives from the fact that all the measures in our study were self-reported. However, given the nature of our study—the relation between efficacy beliefs and engagement—it is difficult to see how this issue could have been circumvented. Moreover, whereas it is possible that the associations among our measures (especially those between efficacy beliefs and engagement at Time 1) have been inflated due to self-report bias, it is not immediately clear why and how such a bias—if any—would have affected our results longitudinally.

Third, and with regard to the causal relationship from efficacy beliefs to engagement reported in this study, some of the studies cited in the introduction also support reverse relationships, that is, from engagement to efficacy beliefs over time (e.g., Llorens et al., 2007; Simbula et al., 2011; Xanthopoulou et al., 2007). According to Salanova, Schaufeli, Xanthopoulou, and Bakker (2010), it is likely that positive psychological constructs like efficacy and engagement mutually reinforce each other, thus constituting a so-called gain spiral. Although such effects are an interesting field of study, and we do not doubt to analyze these reciprocal effects, they are outside the scope of the present study.

Fourth, this research has been done using a specific kind of task, that is, innovative and creative task. Of course, it would be interesting to take the nature of the task into account in future research, as—according to the literature—it is an important determinant of whether or not we experience work engagement (Bakker et al., 2011; Schaufeli & Salanova, 2011). For example, in the area of "flow"—a construct that is conceptually related to engagement—Quinn (2005) confirmed that the degree to which people experience flow is affected by the type of task a person is performing.

Finally, the study participants were students who were rewarded for their participation. Although every effort was made to maximize the resemblance of the study tasks with real-life work, it is clear that the characteristics of this sample differ from those of the working population. In this sense, it is unclear whether the findings can be generalized to a broader group of workers. However, as our findings are in line with previous research by Salanova et al. (2003) and Xie (2007), we suspect that our findings are not restricted to the current population.

In line with these limitations, it would be interesting to replicate this study with a more engaging task. This would allow us to check whether efficacy beliefs not only protect from demotivation, but also foster motivation. Evidently, replicating this study in a sample consisting of workers from real organizations working in natural teams would also be warranted.

Moreover, another interesting avenue for future research in this area could be varying the nature of the two short breaks between the three tasks. For example, Fritz et al. (2011) found that strategies related to learning, meaning, and positive relationships may create positive experiences for oneself and those around. This, in turn, may help employees and work groups to regulate their behaviors and emotions in accordance with organizational rules and expectations. Thus, in future research, we could instruct participants to use different kinds of strategies to recover during the short breaks and analyze whether there are differential effects on their levels of engagement in the subsequent tasks.

Although performing this study among e-groups is a strength since, as we have explained, virtual teams are gaining popularity among organizations, it is important to note that comparing face-to-face groups to e-groups was not the objective of this paper. However, future research could focus on comparing the relationship between efficacy beliefs and task engagement in both kinds of groups. In this way, it could also be tested whether virtual teams are indeed "a new type of team" (Bell & Kozlowski, 2002) or that the distinction between virtual teams and colocated teams is unrealistic and artificial as all teams can be described in terms of their "virtuality" (Cohen & Gibson, 2003; Griffith, Sawyer, & Neale, 2003; Martins, Gilson, & Maynard, 2004).

Implications

In spite of these limitations, we believe that this study has both theoretical and practical implications. As regards the first, the effect of efficacy beliefs on engagement has often been addressed (i.e., Halbesleben, 2010). To this, this paper showed how efficacy beliefs as measured at baseline affect the levels of individual and collective task engagement at later points in time, underlining its strong predictive power. Moreover, these findings are in line with the assumptions of the *SCT* (Bandura, 1997), stating that efficacy beliefs provide people with a self-motivating mechanism that mobilizes effort to target behavior toward goals and to persist over time. These findings underline the positive effect of efficacy beliefs on engagement both in and over time, and also in different levels (i.e., individual and group levels). More specifically, we demonstrated that high initial levels of efficacy beliefs protect individuals and e-groups from becoming disengaged.

Regarding practical implications, large changes are occurring in organizations: Employees are increasingly working in groups rather than individually, and the use of new technologies in these groups is increasing, sometimes converting them into e-groups. Therefore, from a practical point of view, it is important for present-day organizations to not only have engaged employees but also engaged teams. As Halbesleben (2010) pointed out, organizations have become increasingly interested in how to develop engagement in employees. This is because there are significant associations with critical outcomes such as commitment, performance, health, and turnover intention. Thus, having teams and employees engaged may be a need to address in the workforce.

Moreover, this study is in the same line of the meta-analysis done by Halbesleben (2010), where the author expressed that the development of employee resources, especially self-efficacy, is the best mechanism for organizations to consider as they focus on engagement–development interventions. In this line, it would be worthy for managers to know how to increase their employees' efficacy beliefs. It is well known that there are four sources of efficacy beliefs: enactive mastery, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997). In the case of e-groups, the leader of the group could remind the rest of the group past success or, in case it is a new e-group, can use verbal persuasion, for instance, sending to all members an e-mail that expresses how much confidence the leader has in the competence of every single member of the group.

In addition, our results demonstrated that parallel processes are operating at the individual level and the collective (i.e., team) level. Moreover, when individuals in teams must work on non-challenging tasks, our findings suggest that strengthening their efficacy beliefs in advance could prevent loss of motivation (i.e., disengagement) during task performance. Similarly, for organizations focusing on the promotion of employee engagement, first, it should not only be targeted at the individual worker level, but also at the collective team level, and second, it may be efficient to simultaneously bolster employee self-efficacy as a catalyst of engagement (cf. Halbesleben, 2010).

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