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"Yes, I Can, I Feel Good, and I Just Do It!" On Gain Cycles and Spirals of Efficacy Beliefs, Affect, and Engagement

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Taking Bandura's Social Cognitive Theory as our starting point, we tested how efficacy beliefs (self-efficacy and perceived collective efficacy) reciprocally influence activity engagement (vigor, dedication, and absorption) indirectly through their impact on positive affect (enthusiasm, satisfaction, and comfort) over time. We conducted two longitudinal studies using independent samples. Study 1 is a two-wave longitudinal field study that examines gain cycles regarding the dynamic relationships among self-efficacy, positive affect, and work engagement in 274 secondary school teachers. Study 2 is a three-wave longitudinal laboratory study about gain spirals in the dynamic relationships among collective efficacy beliefs, positive affect, and task engagement in 100 university students working in groups. Our findings show that: (1) efficacy beliefs reciprocally influence activity engagement indirectly through their impact on positive affect over time; (2) enthusiasm is the positive affect with the strongest effect on activity engagement; and (3) a gain spiral exists whereby efficacy beliefs increase over time due to engagement and positive affect (most notably enthusiasm). Finally, we discuss the theoretical and practical implications in terms of Social Cognitive Theory.

INTRODUCTION

People differ in their beliefs about their competences and success in different areas of their life, and there is considerable evidence for the positive effects of self-efficacy in different domains such as the workplace, school, and sports

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(Bandura, 1999, 2001). According to Social Cognitive Theory (SCT), self-efficacy refers to ". . . beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Whatever other factors serve as guides and motivators, their roots lie in the core belief that one has the power to produce the desired effects by one's own actions; otherwise, one has little incentive to act or to persevere in the face of difficulties.

Efficacy beliefs include not only personal self-efficacy but also perceived collective efficacy. Research carried out in organisational settings shows that when people work together, they may share beliefs and affective experiences, thus displaying similar motivational and behavioral patterns (George, 1990, 1996) and experiencing a shared affective tone within the group (Barsade, 2002; Bartel & Saavedra, 2000). In that sense, the SCT extends the conception of individual human agency to collective agency, that is, people's shared beliefs in their collective power to produce desired results. Although collective efficacy beliefs include aspects that emerge from the group, they serve similar functions and operate through similar processes as do personal efficacy beliefs (Bandura, 1997). A growing body of research attests to the impact of perceived collective efficacy on group processes. Some of these studies assess the affective, motivational, and behavioral effects of perceived collective efficacy instilled experimentally at the collective level (Arthur, Bell, & Edwards, 2007; Gully, Incalcaterra, Joshi, & Beaubien, 2002; Llorens, Schaufeli, Bakker, & Salanova, 2007; Salanova, Llorens, Cifre, Martínez, & Schaufeli, 2003). Recently, a meta-analysis involving 96 studies (6,125 groups and 31,019 individuals) performed by Stajkovic, Lee, and Nyberg (2009) revealed a significant positive correlation between collective efficacy and group performance. As a whole, the findings of these studies show that the stronger the collective efficacy beliefs are, the greater the group accomplishments will be, in terms of group performance. To sum up, efficacy beliefs (through cognitive, affective, and motivational regulatory mechanisms) influence how people feel, how much effort they invest in actions, how long they persevere in the face of obstacles and failures, and how resilient they are to adversity.

However, although past research has confirmed the existence of links between efficacy beliefs and performance, it is also important to uncover the psychological mechanisms (i.e. affect and motivation) underlying the development of these efficacy beliefs over time. More longitudinal research is therefore required to investigate these dynamic, reciprocal relationships among self-efficacy, affect, and motivation over time. The current study is innovative in that we show how efficacy beliefs influence positive affect (how well people feel) and motivate behavior (how engaged people are in their activities in terms of effort, persistence, dedication, and absorption) and assumes the existence of an amplifying effect whereby *these positive*

states reinforce each other over time. Moreover, we investigate for the very first time how efficacy beliefs (both self-efficacy and perceived collective efficacy), positive affect (enthusiasm, satisfaction, and comfort), and motivation (activity engagement) are dynamically and reciprocally related to each other, thus creating gain cycles and spirals. In other words, we attempt to uncover the affective and motivational mechanisms underlying efficacy beliefs over time. To do so, we need to understand the *sequences* of the psychological experiences that explain these relationships rather than just isolated episodes. Finally, another innovation of this study is that we will extend the SCT because we will specify the *kinds* of affective and motivational states that play a major role as sources of efficacy beliefs. More particularly we concentrate on the "fourth" source of self-efficacy—positive affective experiences.

The Affective Mechanism of Efficacy Beliefs: Positive Affect

Efficacy beliefs influence how people feel. Basically, research has shown that the more efficacy beliefs a person has, the less negative affect such as anxiety and depression he or she will experience (Bandura, 1997). Although studies about the impact of specific efficacy beliefs on positive affect are relatively scarce, a meta-analysis by Judge and Bono (2001) documents the positive intercorrelation of self-efficacy on levels of job satisfaction. However, in this study a measure of generalised self-efficacy was used instead of specific self-efficacy. Another example is the laboratory study by Baron (1990), which found that males reported higher efficacy beliefs than women in the presence of pleasant artificial scents than in their absence.

Moreover, according to the SCT, affect and efficacy beliefs reciprocally come about over time, meaning that positive affect is not only an antecedent of efficacy beliefs, but also a consequence. More specifically, Bandura (1997, 2001) assumed that when people feel contented and satisfied, they are more likely to believe that they are efficacious; consequently, positive affect is also a source of efficacy beliefs. As Bandura (1997, p. 113) concluded, ". . . mood and efficacy beliefs are related both concurrently and predictively". Concomitantly with the SCT, Fredrickson's (2002) Broaden-and-Build Theory (B&BT) assumes similar reciprocal relationships between positive affect and personal resources, such as efficacy beliefs. Specifically, the B&BT assumes that positive emotions appear to *broaden* people's momentary thought-action repertories and to build their enduring personal resources, such as efficacy beliefs. Research (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Tsai, Chen, & Liu, 2007) suggests a positive reciprocal impact of positive emotions and personal resources in such a way that these momentary experiences of positive emotions can

build enduring psychological resources and trigger gain spirals over time that may produce greater emotional well-being. In the present study, however, we used positive affect instead of emotions as positive affect fluctuates less over time because it does not depend so much on momentary stimuli as do emotions.

The Motivational Mechanism of Efficacy Beliefs: Activity Engagement

Efficacy beliefs regulate not only an affective but also a motivational mechanism, namely engagement in an activity (i.e. work/task engagement). When people and groups feel efficacious, they feel good in the short term (positive affect), and in the longer term their engagement in their activity also increases (exemplified by high effort, persistence, dedication, and being absorbed in the activity). A particular, often used definition of work engagement is ". . . a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption in the activity" (Schaufeli, Salanova, González-Romá, & Bakker, 2002, p. 72). If we define engagement as a work-related positive motivational construct and compare it to positive affect, engagement is more stable over time (Gray & Watson, 2001). *Vigor* suggests the willingness to invest effort in one's work, persistence in the face of difficulties, and high levels of energy and mental resilience while working. *Dedication* refers to a particularly strong work involvement and identification with one's job. The final dimension of engagement, *absorption*, denotes being fully concentrated and engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work.

Recent research on engagement suggests that it positively relates to efficacy beliefs (Llorens et al., 2007; Salanova et al., 2003; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). Quite interestingly, it seems that efficacy beliefs may not only precede, but also follow engagement (Carver & Scheier, 1990; Llorens et al., 2007; Salanova, Bresó, & Schaufeli, 2005). For example, in a sample of Spanish and Belgian students, Salanova et al. (2005) showed that current academic efficacy beliefs influence high levels of academic engagement, which in turn influence students' future efficacy beliefs over time. In a similar vein and using a two-way longitudinal design, Xanthopoulou et al. (2007) showed that there is a reciprocal relationship between efficacy beliefs and work engagement, also over time. More specifically, efficacy beliefs at Time 1 (T1) relate to work engagement at Time 2 (T2) and vice versa, thus suggesting a positive reciprocal gain cycle. Llorens et al. (2007) also conducted a two-wave longitudinal study and examined the relationship between personal resources (i.e. efficacy beliefs) and task resources (i.e. time control and method control), on the one hand, and task engagement on the other. The results from this study show that task resources have a positive

impact on efficacy beliefs which, in turn, foster task engagement. In addition, engagement boosts future efficacy beliefs, which in turn lead to the perception of more task resources. Taken together, the results from the previous studies seem to suggest the existence of a gain cycle: efficacy beliefs relate positively to engagement over time, which in turn relates positively to efficacy beliefs, and so on.

Positive Affect and Activity Engagement

As argued above, reciprocal relationships have been reported between efficacy beliefs and activity engagement. However, we believe that a similar reciprocal relationship may also exist between positive affect and activity engagement. Research shows that positive affect facilitates approach behavior, which prompts individuals to be engaged in particular activities (Cacioppo, Gardner, & Berntson, 1999; Carver & Scheier, 1990; Clore, 1994). In contrast to affect, which reflects immediate adaptive responses to the (work) environment, engagement is defined as a relatively more stable work-related motivational state. A study conducted among Dutch managers (Schaufeli & Van Rhenen, 2006) showed that, indeed, positive affect partially mediates the relationship between job resources (job control, task variety, performance feedback, and opportunities for learning and development), on the one hand, and work engagement and organisational outcomes (commitment and intention to stay) on the other. Hence, this study corroborates the theoretical claim (based on a structural model of affect) that positive affect mediates the relationship between the work environment and work-related motivational states such as work engagement. Following this lead, we expect positive affect to also mediate the relationship between personal resources, such as self-efficacy and activity engagement.

This means that when self-efficacious employees feel good at work, they are more likely to show greater interest in their work and, as a result, may end up feeling more motivated and engaged. Being engaged at work also makes employees feel more efficacious, thereby establishing a reciprocal relationship over time. Furthermore and in a similar vein, research (Sonnentag, Mojza, Binnewies, & Scholl, 2008) has shown that work engagement and disengagement (psychological detachment from work during off-job times) relates to a person's affective state at the end of a working week. More particularly, high work engagement in combination with high levels of off-the-job detachment predicts the highest levels of positive affect. To date, however, it is not clear to what extent the activity level implied in particular affects has a differential effect on engagement. Therefore in the present study we include three positive affect states characterised by decreasing levels of activity (enthusiasm, satisfaction, and comfort, respectively) in order to examine the differential effect of each of these affects on activity engagement.

On Reciprocal Gains and Spirals of Efficacy Beliefs, Positive Affect, and Activity Engagement

It is important to note that some of the aforementioned studies take into account reciprocal causation between efficacy beliefs and affective and motivational constructs. In fact, reciprocal causation is quite plausible because we are dealing with dynamic processes that unfold over time, rather than with one-directional causal relationships (Bandura, 1997, 2001). In other words, we need to understand the *sequences* of psychosocial experiences that explain these relationships rather than just isolated episodes. For this reason, the concept of reciprocal gain processes plays a key role. Moreover, the idea of reciprocal gain processes is consistent with cyclic relationships between psychological states that positively relate to each other over time.

Hence in order to study the dynamic interplay of efficacy beliefs, positive affect, and engagement, a longitudinal research design is necessary to disentangle cause and effect. Such studies, particularly those that combine causal and reversed causal effects into one reciprocal causation model, are relatively scarce. In the present study, we examine the reciprocal relationships among efficacy beliefs (self-efficacy and collective efficacy), positive affect, and activity engagement over time using two independent longitudinal studies.

As noted above, research suggests that the same reciprocal psychological mechanisms that operate at the individual level (self-efficacy, positive individual affect, and engagement) also operate at the collective level (perceived collective efficacy, positive collective affect, and collective task engagement). Accordingly, we investigate a research model (see Figures 1 and 2) which assumes that efficacy beliefs (both personal and collective) lead to more activity engagement through three positive affects: enthusiasm, satisfaction, and comfort. Moreover, a reciprocal gain process assumes that engagement (vigor, dedication, and absorption) influences efficacy beliefs over time. Finally, it is important to emphasise that our research uses both cycles and spirals to explain these reciprocal relationships among psychological states. Gain *cycles* assume a positive reciprocal relationship among two or more constructs over time, i.e. A is positively related to B, and B is positively related to A over time. Gain *spirals* go a step beyond and refer to *amplifying loops* in which cyclic reciprocal relationships among constructs build on each other positively over time (Lindsley, Brass, & Thomas, 1995). In order for a gain spiral to exist, three basic conditions have to be met: (1) normal and reversed causation (also known as a reciprocal relationship); (2) an increment in the mean levels of the variables over time; and (3) gain spirals should be examined in longitudinal research with at least three waves that make it possible to test for an increase, decrease, or stability of the mean levels across time.

In other words, empirical evidence on both reciprocal relationships and changes over time using at least three-way waves is essential to document the

existence of gain *spirals*. It is important to note that the differences between cycles and spirals are of a more methodological than theoretical nature, since cycles may evolve into spirals when the previously mentioned conditions are met. There are two important issues to be pointed out here. First, the first two conditions are statistically independent. As we will see below, most empirical studies on gain spirals comply with the first condition, but rarely with the second. Consequently this means that, strictly speaking, only "cycles" of positive, bi-directional relationships are observed rather than "spirals". That is, no evidence is presented of increments or amplifying loops that result in increased levels. Second, "real" causation can only be established when using experimental designs with a random assignment of subjects to conditions. Clearly, this is virtually never the case for research that is conducted in organisational settings. Hence there is a need for theory-grounded longitudinal field studies that assess variables over time using proper sequences and intervals that enhance confidence in (reciprocal) causal relationships (Mathieu & Taylor, 2006). The current study seeks to fill this void.

The Current Study

Taking previous research as its starting point, the objective of our study is to examine, for the first time, a reciprocal structural model of dynamic gain cycles and gain spirals of efficacy beliefs, positive affect, and activity engagement. Specifically, and based on Bandura's SCT, we test how efficacy beliefs (both self-efficacy and collective efficacy) influence activity engagement (vigor, dedication, and absorption) indirectly over time through their impact on positive affect (enthusiasm, satisfaction, and comfort). To this end, we conducted two independent longitudinal studies with two and three waves, respectively.[1]

STUDY 1: GAIN CYCLES OF SELF-EFFICACY, POSITIVE AFFECT, AND WORK ENGAGEMENT AMONG TEACHERS

The first study is a two-wave follow-up study among secondary-school teachers. According to previous research on the affective and motivational mechanisms of self-efficacy, we expect (Hypothesis 1) a positive *cycle* of self-efficacy, positive affect, and engagement to exist over time (T1–T2) by way of reciprocal causality. More specifically, we expect feeling self-efficacious at T1 to positively influence T2 engagement indirectly via T1 positive affect. Furthermore, T1 engagement is in turn expected to positively influence T2 self-efficacy. Finally, we sought to uncover whether positive

[1] Further information about the two specific studies is available to readers on request from the first author.

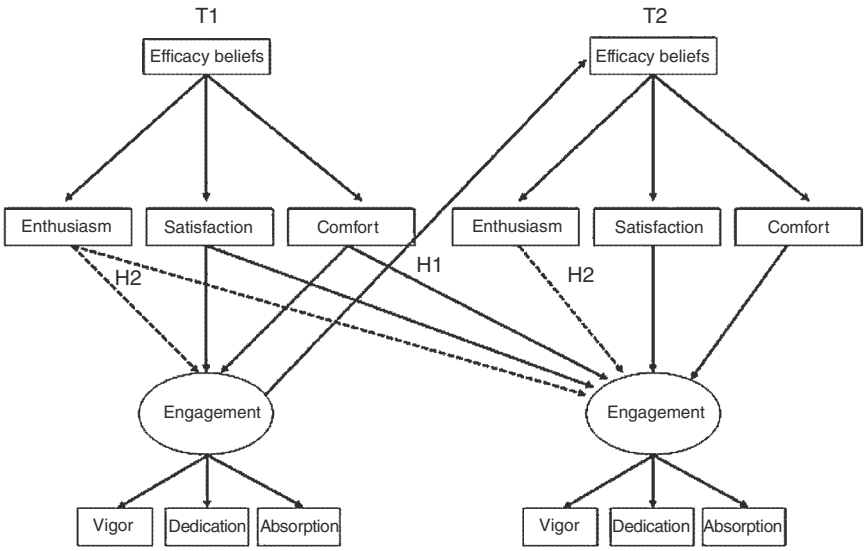

FIGURE 1. Conceptual model for Study 1. Positive predictions for all the relationships.

Notes: Solid lines represent Hypothesis 1; dotted lines represent Hypothesis 2.

affects characterised by high activation (enthusiasm) have stronger effects on engagement than positive affects characterised by lower levels of activation (satisfaction and comfort), both concurrently and longitudinally (Hypothesis 2). This goes one step beyond previous research, which did not take into account the activity level of affect in its relationship with engagement. The hypotheses of Study 1 are displayed in Figure 1.

METHOD

Sample and Procedure

At the beginning of the academic year, we sent a letter to 50 Spanish secondary schools explaining the goal of the research. Self-report questionnaires were sent out to 600 secondary teachers from these schools. At T1 the sample comprised 483 teachers (56% women) from 34 different secondary schools (81% response rate). Ages ranged from 23 to 60 years ($M = 40.2$; $SD = 8$ years and 2 months); 87 per cent held a master's degree and 83 per cent worked in public schools. The questionnaires were given out in envelopes together with a cover letter explaining the purpose of the study and that participation was

voluntary with guaranteed confidentiality. Respondents returned the completed questionnaires in a sealed envelope either to the person who had given them out or directly to the research team. At T2, 8 months later, we sent out questionnaires again to the same 34 schools. After deleting missing cases, 274 secondary teachers (57% women) from 24 secondary schools participated in the longitudinal study (59% return rate). Hence, 57 per cent of the teachers who participated at T1 also participated at T2. Ages ranged from 23 to 60 years ($M = 40$; $SD = 7$ years and 1 month).

In order to test whether the drop-outs ($N = 209$) differed from the panel group ($N = 274$), we compared the T1 background variables of both groups (age, gender, type of school—private vs. public, teaching experience, and organisational tenure) to the main study variables at T1. The results of both Multivariate Analyses of Variance showed no significant differences between the two groups regarding the background variables [$F(5, 464) = .41$, $p = .83$] or the study variables [$F(7, 454) = .91$, $p = .49$]. That is, the panel group differed from the drop-outs neither in terms of background nor in terms of the study variables.

Measures

Efficacy Beliefs. We measured self-efficacy by adapting the general self-efficacy scale (10 items; 0 "*never*" to 6 "*always*") from Schwarzer (1999) to a more specific measure of teacher's self-efficacy in order to be consistent with the SCT, which states the importance of using specific measures of efficacy beliefs. Instead of the specific version for teachers (Schwarzer & Hallum, 2008), we used the adapted general version to make it more comparable with that of Study 2. More specifically, we rephrased the general version in both studies to match the specific context of teaching (Study 1) and working in groups (Study 2), respectively. For instance, for Study 1 we changed "*I can solve most problems if I invest the necessary effort*" to "*I can solve most problems in my teaching tasks if I invest the necessary effort*"; and for Study 2 the corresponding item will read: "*I feel confident about the capability of my group to perform the tasks very well*".

Positive Affect. By asking the participants "How did *you feel* during the last four weeks at your work?", we measured three specific job-related positive affects (Cifre & Salanova, 2002; Warr, 1990). We assessed three affects that differ in terms of their level of activation (0 "*never*" to 6 "*always*"): (1) "enthusiasm" (high level of activation) using the enthusiasm-depression scale (Warr, 1990), which asked teachers about the extent to which they felt "depressed", "gloomy", "miserable" (all three items were reversed), "cheerful", "enthusiastic", and "optimistic" at work; (2) "satisfaction" (medium level of activation) using the three-item "faces scale", an

affect-based measure (Kunin, 1955) referring to satisfaction with the task, one's colleagues and supervisor, and one's school, respectively; and (3) "comfort" (low level of activation) using the comfort-anxiety scale (Warr, 1990), which asked teachers about the extent to which they felt "tense", "uneasy", "worried" (all three items were reversed), "calm", "contented", and "relaxed" at work.

Activity Engagement. We measured work engagement with the Spanish version (Salanova, Schaufeli, Llorens, Peiró, & Grau, 2000) of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002), which includes three dimensions: vigor (six items; e.g. "*I can continue working for very long periods at a time*"); dedication (five items; e.g. "*For me, my job is challenging*"); and absorption (six items; e.g. "*When I'm working, I forget everything around me*"). Items were scored on a 7-point rating scale (0 "*never*" and 6 "*always*").

Data Analyses: Model Fit

First, we performed Confirmatory Factor Analyses (CFA) using AMOS 17.0 to test a measurement model that distinguishes among positive affect (i.e. enthusiasm, satisfaction, comfort) and engagement (i.e. vigor, dedication, and absorption). Based on Caprara, Pastorelli, Regalia, Scabini, and Bandura (2005), we tested three models: (1) a one-factor model where all constructs are the expression of a single latent (positive) factor; (2) a six-factor orthogonal model in which all constructs are independent; and (3) a six-factor oblique model in which the factors correlated. Second, we used Structural Equation Modeling (SEM) to test Hypotheses 1 and 2. Five competitive models were tested: (1) the Stability Model (M1) without cross-lagged structural paths, but with temporal stabilities and synchronous correlations among variables at T1 and among variables at T2; (2) the Causality Model (M2), which includes additional cross-lagged structural paths from T1 efficacy beliefs to T2 positive affect and to T2 engagement, as well as from T1 positive affect to T2 engagement; (3) the Reversed Causation Model (M3), which includes additional cross-lagged structural paths from T1 engagement to T2 positive affect and to T2 efficacy beliefs, as well as from T1 positive affect to T2 efficacy beliefs; (4) the Reciprocal Model (M4), which includes reciprocal relationships among efficacy beliefs, positive affect, and engagement, thus including all the paths of M2 and M3; and (5) the Constrained Model (M5), in which different parameters are constrained to be equal in order to control for the stability between the constructs from T1 to T2. We allowed the measurement errors of the corresponding indicators of T1 and T2 to covary over time (Pitts, West, & Tein, 1996).

We used maximum likelihood estimation methods by computing the absolute and relative indices of goodness-of-fit (Marsh, Balla, & Hau, 1996):

the χ^2 Goodness-of-Fit Statistic, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA), as well as the Comparative Fit Index (CFI), the Incremental Fit Index (IFI) and the Tucker-Lewis Index (TLI). Values below .08 for RMSEA indicate an acceptable fit. For the remaining indices, values greater than .90 indicate a good fit (Hoyle, 1995). Finally, we computed the Akaike Information Criterion (AIC; Akaike, 1987) to compare non-nested competing models. The lower the AIC index is, the better is the fit of the model to the data.

Finally, a repeated measures Multiple Analyses of Variance (MANOVA) was conducted to assess if there were significant differences on the intra-subjects dynamic in the variables of the study (self-efficacy, positive affect, and engagement) over time. Also, different Analyses of Variance (ANOVA) and intra-subjects contrasts were performed in order to know the trends of each variable over time.

RESULTS

Descriptive Analyses

Table 1 displays the results of the descriptive analyses, that is, internal consistencies (Cronbach's α), stabilities, and intercorrelations of the scales. All alphas meet the criterion of .70 except satisfaction, which approaches that criterion with a value of .69. As expected, the pattern of correlations shows that all scales interrelate significantly and positively. The common method variance test for the T1 variables, using Harman's single-factor test with the CFA (e.g. Iverson & Maguire, 2000), reveals that one single factor could not account for the variance in the data [Delta $\chi^2(2) = 112.3$, $p < .001$]. Consequently, our dataset apparently presents no problems in terms of common method variance.

Confirmatory Factor Analyses

The CFA among T1 positive affect and engagement, based on Caprara et al. (2005), shows that the oblique model is the model that best fits the data compared to the one-factor model [Delta $\chi^2(6) = 259.67$, $p < .001$] and the orthogonal model [Delta $\chi^2(6) = 1070.04$, $p < .001$]. Moreover, all the fit indices of the oblique model, except RMSEA, meet their corresponding criteria ($\chi^2 = 51.81$, df = 6, GFI = .97, RMSEA = .10, CFI = .97, IFI = .97, AIC = 81.81). Taken together, these results suggest that enthusiasm, satisfaction, comfort, vigor, dedication, and absorption are positively related yet *distinct* constructs.

TABLE 1
Means (*M*), Standard Deviations (*SD*), Internal Consistencies (Cronbach's α), Stabilities (on the diagonal), and Zero-order Correlations, Study 1 ($N = 274$)

Variables	M	SD	α	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1. Efficacy T1	3.93	.87	.93	–												
2. Efficacy T2	4.02	.81	.95	.64***	–											
3. Enthusiasm T1	4.19	.95	.87	.41***	.48***	–										
4. Enthusiasm T2	4.18	.95	.89	.53***	.41***	.72***	–									
5. Satisfaction T1	4.02	.93	.69	.32***	.37***	.44***	.43***	–								
6. Satisfaction T2	4.19	.89	.70	.47***	.32***	.42***	.51***	.64***	–							
7. Comfort T1	3.73	1.06	.88	.36***	.39***	.71***	.56***	.33***	.33***	–						
8. Comfort T2	3.70	1.04	.87	.45***	.35***	.59***	.76***	.38***	.46***	.64***	–					
9. Vigor T1	4.12	.93	.83	.38***	.42***	.56***	.43***	.24***	.27***	.42***	.41***	–				
10. Vigor T2	4.06	.92	.86	.46***	.34***	.45***	.48***	.25***	.37***	.29***	.41***	.64***	–			
11. Dedication T1	3.88	1.12	.90	.37***	.48***	.62***	.48***	.35***	.31***	.42***	.37***	.66***	.48***	–		
12. Dedication T2	3.86	1.09	.90	.51***	.42***	.52***	.57***	.34***	.44***	.35***	.44***	.57***	.74***	.67***	–	
13. Absorption T1	3.54	1.04	.80	.27***	.28***	.31***	.25***	.11*	.21**	.14*	.15*	.53***	.41***	.58***	.50***	–
14. Absorption T2	3.48	1.01	.82	.26***	.17***	.23***	.22***	.12*	.22***	.12*	.12*	.42***	.54***	.48***	.61***	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. T1 = Time 1, T2 = Time 2.

The Hypothesised Structural Model

Table 2 displays the overall fit indices of the five competing models for Study 1. The *causality model* (M2) is superior to that of the *stability model* (M1) [Delta $\chi^2(1) = 16.23$, $p < .001$]. This suggests the relevance of cross-lagged paths from T1 efficacy beliefs to T2 positive affect and T2 engagement, and from T1 positive affect to T2 engagement. Furthermore, the *reversed causality model* (M3) also fit the data significantly better than the *stability model* (M1) [Delta $\chi^2(3) = 41.89$, $p < .001$] and than the *causality model* (M2) [Delta $\chi^2(2) = 25.66$, $p < .001$]. This indicates that the model with the cross-lagged paths from T1 engagement to T2 positive affect and to T2 efficacy beliefs, as well as from T1 positive affect to T2 efficacy beliefs, also shows a better fit to the data than the model including only temporal stabilities and synchronous correlations (M1) and than the model including causal relationships among the variables (M2). Moreover, it appears that the *reciprocal model* (M4) with the addition of reciprocal effects was superior to the *stability model* (M1) [Delta $\chi^2(5) = 69.77$, $p < .001$], the *causality model* (M2) [Delta $\chi^2(4) = 53.54$, $p < .001$], and the *reversed causality model* (M3) [Delta $\chi^2(2) = 27.88$, $p < .001$]. Finally, the *reciprocal model* (M4) also appears to be superior to the *constrained model* (M5) [Delta $\chi^2(1) = 18.88$, $p < .001$]. Hence, both causal and reversed causal paths are important, as the model with cross-lagged reciprocal relationships between efficacy beliefs, positive affect, and engagement (M4) fits the data best, even when controlling for the T1–T2 stability of the variables. The final model with only the significant paths is depicted in Figure 2.

The structural relationships of M4 reveal that all indicators of engagement have loadings on the intended latent factor ranging from .61 to .85 at T1 and ranging from .62 to .93 at T2. The autocorrelations between the two waves are .60 for efficacy beliefs, .18 for enthusiasm, .49 for satisfaction, .20 for comfort, and .65 for engagement. Hence, the findings of Study 1 show that (only the cross-lagged effects are explained): (1) T1 self-efficacy leads to T2 engagement indirectly through T1 positive affect and (2) T1 engagement, in turn, positively influences T2 positive affect and efficacy beliefs reciprocally (Hypothesis 1) over time. More specifically, T1 efficacy beliefs are positively related to T1 positive affect [enthusiasm ($\beta = .50$, $p < .001$), satisfaction ($\beta = .38$, $p < .001$), and comfort ($\beta = .41$, $p < .001$)], and T1 enthusiasm in turn positively influences T2 engagement ($\beta = .29$, $p < .001$). In addition, T1 engagement positively influences T2 efficacy beliefs ($\beta = .16$, $p < .001$), and also T2 enthusiasm ($\beta = .38$, $p < .001$), satisfaction ($\beta = .22$, $p < .001$), and comfort ($\beta = .39$, $p < .001$). That is, we corroborate the expected gain cycle of self-efficacy and engagement over time (T1–T2) via positive affect by showing dynamic reciprocal causality.

Furthermore, a repeated measures MANOVA test was conducted to assess if there were significant differences depending on time in the study variables and if means values of main variables (self-efficacy, positive affect, and

TABLE 2
Longitudinal Model Fit in Secondary School Teachers, Study 1 ($N = 274$): SEM

Models	χ^2	*df*	*GFI*	*AGFI*	*RMSEA*	*CFI*	*IFI*	*TLI*	*AIC*	*Difference test*
M1. Stability	256.31	60	.90	.81	.10	.92	.92	.88	346.31	
M2. Causality	240.08	59	.90	.82	.10	.93	.93	.90	332.08	a = 16.23(1)***
M3. Reversed	214.42	57	.91	.83	.10	.94	.94	.90	310.42	a = 41.89(3)***
										a = 25.66(2)***
M4. Reciprocal	186.54	55	.91	.89	.08	.95	.95	.91	286.54	a = 69.77(5)***
										a = 53.54(4)***
										a = 27.88(2)***
M5. Constrained	205.42	56	.90	.82	.09	.94	.94	.90	303.42	a = 50.89(4)***
										a = 34.66(3)***
										a = 9(1)***
										a = 18.88(1)***

Notes: χ^2 = chi-square; df = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC = Akaike Information Criterion; *** $p < .001$; a = chi-square differences.

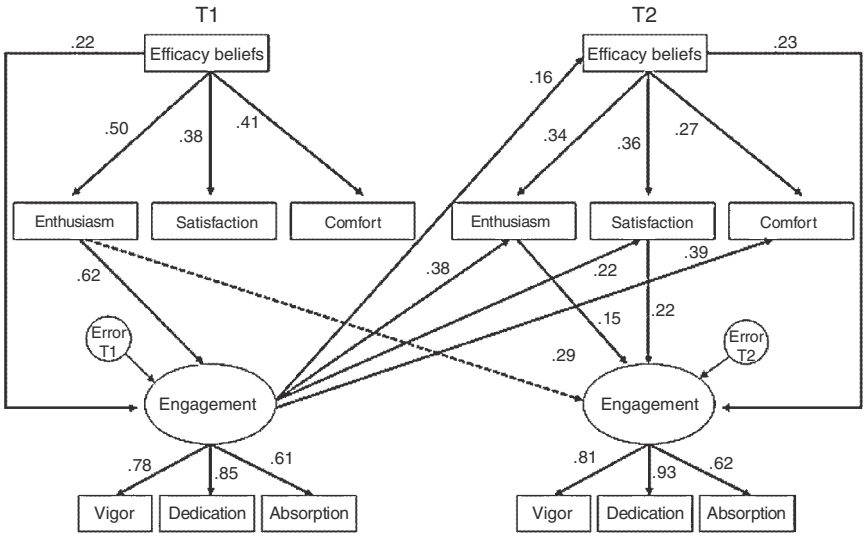

FIGURE 2. Conceptual model for Study 2. Positive predictions for all the relationships.

Notes: Solid lines represents Hypothesis 3; dotted lines represent Hypothesis 4.

engagement) increase over time. Significant multivariate effects were found for the main effect of time (T1, T2), Wilks's Lambda = .929, $F(7, 267) = 2.89$, $p < .01$, multivariate $\eta^2 = .071$. The follow-up repeated measures ANOVAs indicated that the main effect of time was significantly different for self-efficacy [$F(1, 273) = 3.96$, $p < .05$] and satisfaction [$F(1, 273) = 12.98$, $p < .001$]. Contrasts intra-subjects revealed a significant linear trend in both cases, for self-efficacy [$F(1, 273) = 3.96$, $p < .05$] and satisfaction [$F(1, 273) = 12.98$, $p < .001$]. Thus, teachers increased significantly their levels of self-efficacy and job satisfaction over time.

Finally, we also expected positive affect characterised by high activation (enthusiasm) to have stronger effects on engagement than positive affects characterised by a lower level of activation (satisfaction and comfort) (Hypothesis 2). As expected, the results indeed show that T1 enthusiasm exhibits unique effects on T2 engagement.

In sum, our analyses suggested the possible existence of a gain spiral among efficacy beliefs, positive affect, and engagement, which would result in higher levels of efficacy beliefs and satisfaction across time. However, as noted earlier, gain spirals can only be studied adequately by using at least three waves. In consequence, we designed Study 2.

STUDY 2: GAIN SPIRALS OF COLLECTIVE EFFICACY BELIEFS, POSITIVE AFFECT, AND TASK ENGAGEMENT IN WORKING GROUPS

Research increasingly supports the social nature of affect (Parkinson, 1996); and positive emotions and work engagement, for example, are not only individual-level phenomena, but are also collective constructs that are usually assessed at the group level (e.g. Barsade, 2002; Bartel & Saavedra, 2000; George, 1990, 1996; Kelly & Barsade, 2001; Salanova et al., 2003; Salanova, Agut, & Peiró, 2005). Groups of employees in the workplace can share positive affect and engagement, which may lead to positive consequences (Bakker, Demerouti, & Schaufeli, 2005; Salanova et al., 2003, 2005). For example, Salanova et al. (2005) showed that collective engagement, as experienced by employees of service units in hotels and restaurants, had positive organisational consequences in terms of work-unit performance and customer loyalty. In a similar vein, Walter and Bruch (2008) proposed a model that posits the emergence of collective moods and emotions on the work-group level. The authors argued in favor of the existence of a reciprocal linkage between positive group affective similarity and group relationship quality that gives rise to a dynamic, self-reinforcing upward spiral which they called the "positive group affect spiral". Walter and Bruch (2008), however, indicated the need for more longitudinal research to confirm this spiral.

In Study 2, participants worked on group tasks, and we collected measures of efficacy beliefs, positive affect, and engagement at the collective level. In this study, we used a three-wave longitudinal design to test our hypothesis that a positive *spiral* of collective efficacy beliefs and engagement exists over time (T1-T2-T3). We expected this spiral to operate via positive affect and by way of reciprocal causality. More specifically, we expected feeling collective efficacy at T1 to lead to T2 and T3 engagement indirectly through T2 positive affect. Furthermore, we assumed that T1 engagement, in turn, positively influences T2 collective efficacy beliefs and T2 engagement influences T3 collective efficacy beliefs (Hypothesis 3). Finally, as in Study 1, we expected collective positive affect characterised by high activation (collective enthusiasm) to have stronger effects on collective engagement than other positive affects characterised by a lower level of activation (collective satisfaction and comfort) (Hypothesis 4). The hypotheses of Study 2 are displayed in Figure 3.

METHOD

Samples and Procedure

Study 2 is a three-wave longitudinal laboratory study, which includes 100 university students (77% women) who voluntarily participated in three labor-

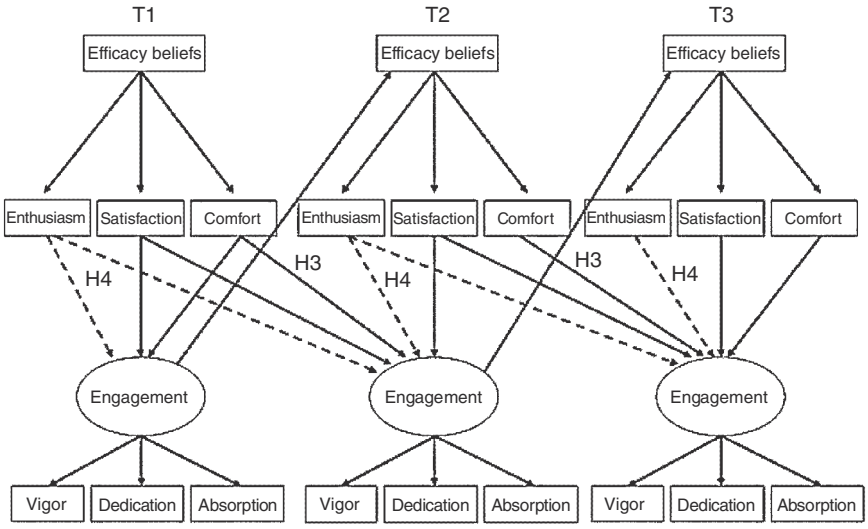

FIGURE 3. Structural path coefficients of the reciprocal model for teachers ($N = 274$).

Notes: Solid lines represent causality and reversed coefficients for Hypothesis 1; dotted lines are the effects for Hypothesis 2. We display only significant coefficients.

atory tasks. Ages ranged from 20 to 38 years ($M = 25$; $SD = 3$ years and 4 months). We organised laboratory sessions with 19 groups of four to seven students. All groups met during three sessions to perform three tasks. We employed an idea generation task (at T1) as a training task. Participants had to come up with a slogan to promote house sales in a specific area. They did this task twice: individually (without interacting with any other group member) and in groups (by selecting the best five slogans after a group discussion). After three weeks (T2), the same groups met again in the second session and followed the same procedure. This time, the groups performed another idea generation task in which they had to come up with three activities for a Cultural Program of Psychology. After three weeks, the students performed the final task (T3) and had to come up with three social projects in which to invest money. There was a small prize of €120 for the best group performance. After finishing each task, the participants filled out a questionnaire, which assessed the study variables.

Measures

In Study 2, we used similar measures to those employed in Study 1, but we tailored them more specifically to the group tasks at hand. Thus, we refor-

mulated the items in the questionnaire so that they referred to the *group* rather than to the individual. Furthermore, we changed the time-frame of the items so that they corresponded to the time intervals between the study waves.

Efficacy Beliefs. We measured "collective efficacy beliefs" by averaging individuals' own perceptions of collective efficacy, as recommended by Earley (1993) and validated by Salanova et al. (2003). The scale is composed of four items ranging from 0 ("*never*") to 6 ("*always*") for use specifically in work groups (e.g. "*I feel confident about the capability of my group to perform the tasks very well*").

Positive Affect. We measured the three specific collective positive affects by asking the participants, "How do you think that *your group* felt during the group work?" More specifically, we assessed: (1) "collective enthusiasm" with the enthusiasm-depression scale (six items) (Warr, 1990; e.g. "*During the task, my group felt enthusiastic*"); (2) "collective satisfaction" with the task using a four-item "faces scale" (Kunin, 1955; e.g. "*During the task, my group felt satisfied with the task itself*"); and (3) "collective comfort" with the comfort-anxiety scale (six items) developed by Warr (1990; e.g. "*During the task my group felt relaxed*"). All items were scored on a 7-point rating scale (0 "*never*" to 6 "*always*").

Activity Engagement. We measured *task collective engagement* (Salanova et al., 2003) by including three dimensions (0 "*never*" to 6 "*always*"): vigor (seven items; e.g. "*During the task, my group felt full of energy*"); dedication (four items; e.g. "*My group was involved in the task*"), and absorption (seven items; e.g. "*Time flew when my group was working*").

Data Analyses

We used SEM methods to test Hypotheses 3 and 4. As in Study 1, we tested the same five different competitive models (see the Data Analyses section of Study 1) but now using three waves. Also, a repeated measures MANOVA test was conducted to assess if there was significant difference in the study variables from T1–T2 and T3: collective efficacy, collective positive affect (enthusiasm, comfort, and satisfaction), and collective engagement (vigor, dedication, and absorption).

Since the variables in Study 2 are collective, first we tested within-group agreements by computing r_{wg} at T1, T2, and T3 using the Agree program (James, Demaree, & Wolf, 1993). The results show average r_{wg} values for the referent-shift consensus of the judgments of the variables in our study that range from .84 to .89 across the three waves. Moreover, these judgments were

also consistently high within each wave, ranging from .76 to .90. This suggests that it is not necessary to eliminate any of these groups because of poor agreement. Moreover, since the sample in Study 2 are working in groups, the relationships among the variables in the study were tested at the group level ($N = 19$). An aggregated database was used in order to test the relationship among the variables in the study. Since there are only 19 groups, correlation analyses were computed instead of SEM (see Bakker, Van Emmerik, & Van Riet, 2008), and also performed a repeated measures MANOVA test at this aggregated level of analysis. The objective was to test if the pattern of the correlations and repeated measures MANOVA test at the group level was consistent with the pattern at the individual level.

RESULTS

Descriptive Analyses

Table 3 displays the results of the descriptive analyses, that is, the internal consistencies (Cronbach's α), stabilities, and intercorrelations of the scales. All α-values met the .70 criterion. As expected, the pattern of correlations shows that all the scales are significantly and positively related to each other. Once again, the results of Harman's single-factor test with CFA (Iverson & Maguire, 2000) on T1 variables reveal that the fit of the single-factor model is significantly poorer than the model with three related latent factors [Delta $\chi^2(2) = 63.99$, $p < .001$]. Consequently, we do not consider common method variance to be a problem in the dataset of Study 2.

The Hypothesised Structural Model

Table 4 displays the overall fit indices of the competing models for Study 2. Again, the model fit of the *causality model* (M2) is superior to that of the *stability model* (M1) [Delta $\chi^2(5) = 33.85$, $p < .001$]. This suggests the relevance of cross-lagged paths from T1 efficacy beliefs to T2–T3 positive affect and T3 engagement, and from T1–T2 positive affect to T2–T3 engagement. Furthermore, the *reversed causality model* (M3) also fit the data significantly better than the *stability model* (M1) [Delta $\chi^2(7) = 49.03$, $p < .001$] and than the *causality model* (M2) [Delta $\chi^2(2) = 15.18$, $p < .001$]. This indicates that the model with the cross-lagged paths from T1 engagement to T2–T3 positive affect and to T2–T3 efficacy beliefs, as well as from T1–T2 positive affect to T2–T3 efficacy beliefs, also shows a better fit to the data than both the model including only temporal stabilities and synchronous correlations (M1) and the model including causal relationships among the variables (M2). Moreover, the *reciprocal model* (M4) appears to have been superior to the *stability model* (M1) [Delta $\chi^2(12) = 79.75$, $p < .001$], the *causality model* (M2) [Delta

TABLE 3
Means (*M*), Standard Deviations (*SD*), Internal Consistencies (Cronbach's α), Stabilities (on the diagonal), and Zero-order Correlations in Students Working in Groups, Study 2 (*N* = 100)

Variables	M	SD	α	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
1. Col.Efficacy T1	4.19	.60	.88	–																			
2. Col.Efficacy T2	4.39	.54	.87	.47***	–																		
3. Col.Efficacy T3	4.44	.57	.84	.45***	.53***	–																	
4. Col.Enthusiasm T1	5.02	.60	.80	.65***	.37***	.46***	–																
5. Col.Enthusiasm T2	5.09	.61	.70	.38***	.51***	.48***	.58***	–															
6. Col.Enthusiasm T3	5.10	.62	.76	.45***	.39***	.52***	.65***	.68***	–														
7. Col,Satisfaction T1	4.87	1.0	.82	.27***	.23*	.20*	.21***	.13	.24*	–													
8. Col.Satisfaction T2	5.23	.94	.82	.20*	.42***	.37***	.38***	.45***	.49***	.31***	–												
9. Col,Satisfaction T3	5.17	.96	.85	.31**	.36***	.53***	.48***	.49***	.65***	.33***	.62***	–											
10. Col.Comfort T1	4.70	.73	.85	.51***	.30***	.37***	.68***	.32***	.41***	.05	.30**	.24***	–										
11. Col.Comfort T2	4.99	.72	.82	.22*	.46***	.32***	.44***	.63***	.35***	.08	.39***	.28**	.53***	–									
12. Col.Comfort T3	4.98	.70	.78	.43***	.38***	.44***	.56***	.50***	.62***	.14	.31***	.45***	.52***	.55***	–								
13. Col.Vigor T1	3.73	.65	.83	.49***	.30***	.41***	.61***	.35***	.53***	.20*	.30**	.41***	.32***	.15	.33***	–							
14. Col.Vigor T2	3.77	.67	.83	.38***	.48***	.51***	.50***	.51***	.66***	.10	.56***	.53***	.39***	.29***	.43***	.64***	–						
15. Col.Vigor T3	3.75	.75	.88	.31**	.37***	.61***	.49***	.52***	.73***	.12	.53***	.66***	.31**	.23*	.33**	.58***	.76***	–					
16. Col.Dedication T1	3.98	.70	.84	.55***	.36***	.41***	.57***	.40***	.55***	.34***	.34***	.42***	.31***	.13	.35***	.82***	.62***	.53***	–				
17. Col.Dedication T2	4.02	.76	.88	.33**	.49***	.49***	.51***	.47***	.65***	.15	.58***	.56***	.35***	.33**	.45***	.65***	.86***	72***	.62***	–			
18. Col.Dedication T3	3.93	.80	.86	.33**	.36***	.54***	.52***	.54***	.76***	.17*	.53**	.67***	.27**	.31**	.47***	.54***	.71***	.82***	.57***	.74***	–		
19. Col.Absorption T1	3.65	.71	.87	.47***	.23***	.37***	.56***	.37***	.55***	.23***	.28***	.42***	.29**	.11	.32**	.81***	.63***	.56***	.80***	.63***	.58***	–	
20. Col.Absorption T2	3.73	.70	.86	.29**	.39***	.42***	.45***	.51***	.68***	.10	.46***	.53***	.25***	.28**	.40***	.56***	.81***	.71***	.56***	.81***	.75***	.69***	–
21. Col.Absorption T3	3.61	.75	.87	.21*	.26*	.53***	.42***	.49***	.69***	.16	.48***	.64***	.24*	.27**	.32***	.48***	.67***	.84***	.39***	.68***	.82***	.53***	.74***

Notes: * $p < .05$; ** $p < .01$; *** $p < .001$. T1 = Time 1, T2 = Time 2, T3 = Time 3. Col. = collective.

TABLE 4
Longitudinal Model Fit in Groups, Study 2 ($N = 100$): SEM

Model	χ^2	*df*	*GFI*	*AGFI*	*RMSEA*	*CFI*	*IFI*	*TLI*	*AIC*	*Difference test*
M1. Stability	260.82	157	.80	.71	.08	.94	.94	.92	408.82	
M2. Causality	226.97	152	.83	.74	.07	.96	.96	.94	384.97	a = 33.85(5)***
M3. Reversed	211.79	150	.84	.75	.06	.96	.96	.95	373.79	a = 49.03(7)***
										a = 15.18(2)***
M4. Reciprocal	181.07	145	.86	.77	.05	.98	.98	.97	353.07	a = 79.75(12)***
										a = 45.90(7)***
										a = 30.72(5)***
M5. Constrained	187.00	146	.85	.76	.05	.97	.97	.96	357.00	a = 73.82(11)***
										a = 39.97(6)***
										a = 24.79(4)***
										a = 5.93(1)*

Notes: χ^2 = chi-square; df = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC = Akaike Information Criterion; *** $p < .001$; a = chi-square differences.

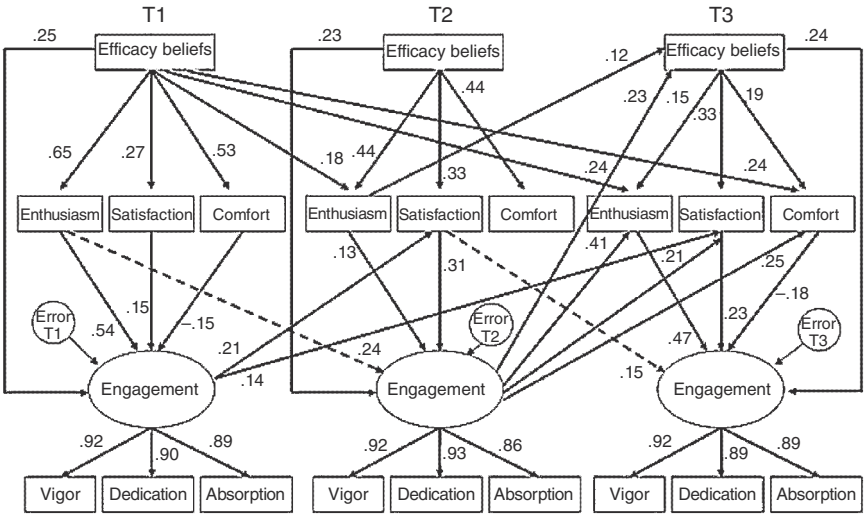

FIGURE 4. Structural path coefficients of the reciprocal model among students working in groups ($N = 100$).

Notes: Solid lines represent direct and reversed causality for Hypothesis 3; dotted lines are the effects for Hypothesis 4. We display only significant coefficients.

$\chi^2(7) = 45.90$, $p < .001$], and the *reversed causality model* (M3) [Delta $\chi^2(5) = 30.72$, $p < .001$]. Finally, the *reciprocal model* (M4) also appears to be superior to the constrained model (M5) [Delta $\chi^2(1) = 5.93$, $p < .05$]. Thus, both the causal and the reversed causal paths are important, as the model with cross-lagged reciprocal relationships between collective efficacy beliefs, collective positive affect, and collective engagement (M4) fits the data best, even when the temporal stability between the constructs has been controlled for. The final model with only the significant paths is depicted in Figure 4.

The specific structural relationships of M4 reveal that the loadings of all indicators of collective engagement on the intended latent factor range from .89 to .92 at T1, from .86 to .93 at T2, and from .89 to .92 at T3. Furthermore, the autocorrelations among the three waves range from .36 to .47 for collective efficacy beliefs, from .33 to .38 for collective enthusiasm, from .22 to .42 for collective satisfaction, from .22 to .39 for collective comfort, and from .41 to .68 for collective engagement. Once more, the findings from Study 2 show that, as far as Hypothesis 3 is concerned, T1 collective efficacy leads to T2 and T3 engagement indirectly through T2 positive affect (enthusiasm and comfort). More specifically, T1 efficacy beliefs are positively related to T1 enthusiasm ($\beta = .65$, $p < .001$), satisfaction ($\beta = .27$, $p < .001$), and comfort

($\beta = .53$, $p < .001$), and also positively influences T2 enthusiasm ($\beta = .18$, $p < .001$), and T3 enthusiasm ($\beta = .24$, $p < .001$), and T3 comfort ($\beta = .24$, $p < .001$). Additionally, T1 enthusiasm leads toT2 engagement ($\beta = .24$, $p < .001$), and T2 satisfaction leads to T3 engagement ($\beta = .15$, $p < .001$). Furthermore, some reversed causal effects were also observed: T1 engagement in turn positively influences T2 and T3 satisfaction ($\beta = .21$, $p < .001$ and $\beta = .14$, $p < .001$); T2 engagement positively influences T3 collective efficacy ($\beta = .23$, $p < .001$) and the three positive affect constructs at T3 (enthusiasm: $\beta = .41$, $p < .001$; satisfaction: $\beta = .21$, $p < .001$; and comfort: $\beta = .25$, $p < .001$).

A repeated measures MANOVA test was conducted to assess if there was significant difference in the study variables depending on time: collective efficacy, collective positive affect (enthusiasm, comfort, and satisfaction), and collective engagement (vigor, dedication, and absorption). Significant multivariate effects were found for the main effect of time (T1, T2, T3), Wilks's Lambda = .739, $F(14, 356) = 4.15$, $p < .001$, multivariate $\eta^2 = .14$. The follow-up repeated measures ANOVAs indicated that the main effect of time was significantly different for collective efficacy [$F(2, 184) = 9.69$, $p < .001$], collective comfort [$F(2, 184) = 11.84$, $p < .001$], and collective satisfaction [$F(2, 184) = 5.39$, $p < .005$]. Intra-subject contrasts revealed a significant linear trend for collective efficacy [$F(1, 92) = 16.17$, $p < .001$, $r = .150$] and a quadratic trend for collective absorption [$F(1, 92) = 5.10$, $p < .05$, $r = .053$]. For collective satisfaction [$F(1, 92) = 5.41$, $p < .05$, $r = .056$ and $F(1, 92) = 5.36$, $p < .05$, $r = .055$] and collective comfort [$F(1, 92) = 17.41$, $p < .001$, $r = .159$ and $F(1, 92) = 5.68$, $p < .01$, $r = .058$] there was a significant linear and quadratic trend, respectively.

These results suggest that at least one tentative gain spiral exists from T1 via T2 to T3, especially in terms of collective efficacy, satisfaction, and comfort (Hypothesis 3). Results also show that, as expected (Hypothesis 4), only collective enthusiasm (the highest activation affect) and collective satisfaction (the medium activation affect) have a significantly and positively cross-lagged effect on T2 and T3 collective engagement.

Finally, since the students are working in groups, we used the aggregated database ($N = 19$ groups). Results show that specific T1 collective efficacy positively correlates with T2 and T3 collective positive emotions (mean $r = .46$ and mean $r = .46$, respectively) and with T2 collective engagement (vigor; $r = .49$). Also T2 collective efficacy positively correlates with T3 collective positive emotions (mean $r = .48$) and with T3 collective engagement (vigor; $r = .47$ and dedication; $r = .55$). Generally speaking, T1 collective positive emotions (especially collective enthusiasm) positively correlate to T2 (vigor and dedication; mean $r = .60$). Finally, T2 collective positive emotions (especially collective enthusiasm and satisfaction) positively correlate to T3 engagement (mean $r = .70$).

Moreover, we also conducted a repeated measures MANOVA test to assess if there were significant differences in the study variables at the collective level

of analyses on aggregated data depending on time ($N = 19$ groups). Similar significant multivariate effects were found for the main effect of time (T1, T2, T3) using aggregated data, Wilks's Lambda = .404, $F(14, 60) = 2.45$, $p < .008$, multivariate $\eta^2 = .36$. The follow-up repeated measures ANOVAs indicated that the main effect of time was significantly different for collective efficacy [$F(2, 36) = 11.84$, $p < .001$], collective comfort [$F(2, 36) = 5.86$, $p < .01$], and collective satisfaction [$F(2, 36) = 4.76$, $p < .01$]. Intra-subject contrasts revealed a significant linear trend for collective efficacy [$F(1, 18) = 18.75$, $p < .001$, $r = .510$] and a quadratic trend for collective absorption [$F(1, 18) = 6.08$, $p < .05$, $r = .253$]. For collective satisfaction [$F(1, 18) = 4.32$, $p < .05$, $r = .193$ and $F(1, 18) = 5.48$, $p < .05$, $r = .234$] and collective comfort [$F(1, 18) = 6.36$, $p < .05$, $r = .261$ and $F(1, 18) = 4.92$, $p < .05$, $r = .215$], there was a significant linear and quadratic trend, respectively. To sum up, the pattern of the correlations and repeated measures MANOVA test at the group level was consistent with the pattern of the individual perceptions of the collective constructs.

DISCUSSION

In this study, we tested a structural model of dynamic gain cycles and spirals of efficacy beliefs. Specifically, we sought to uncover whether different types of efficacy beliefs (self-efficacy and collective efficacy) have similar effects over time on activity engagement, albeit indirectly through their impact on positive affect. In order to answer this research question, we conducted two different longitudinal studies: a field study among teachers and a laboratory study among groups. In both studies, we assessed similar psychological constructs to test gain *cycles* in Study 1 (reciprocal causation) and gain *spirals* in Study 2 (reciprocal causation plus increased levels on the constructs studied over at least three time periods). The results of both studies contribute to our understanding of the pivotal role that efficacy beliefs play in dynamic gain cycles and spirals which increase both positive affect and activity engagement over time.

Our findings show that high levels of efficacy beliefs enhance engagement via positive affect through a kind of gain cycle and a tentative gain spiral that operates over time. Our two longitudinal studies confirm Hypotheses 2 and 4. More specifically, positive affect that is characterised by high activation (enthusiasm) has a stronger effect on activity engagement than positive affects that are characterised by a lower level of activation (satisfaction and comfort). Interestingly, and unexpectedly, we found that not all positive affects have the same predictive power regarding activity engagement. For example, Study 2 shows that low arousal positive affect (comfort) may even relate negatively with engagement, but positively with efficacy beliefs. In addition, the more comfort experienced at T1 (and at T3), the lower the levels of engagement reported at T1 (and at T3) will be. However, our results reveal that efficacy

beliefs are positively related with comfort, both concurrently and longitudinally. It appears that comfort relates differently with engagement as compared with efficacy beliefs; high levels of efficacy beliefs increase levels of comfort, and vice versa, thus constituting a kind of gain cycle over time. However, feeling comfortable is negatively related with activity engagement. This is probably because comfort is a low-activation affect whereas, conversely, high activation characterises the experience of engagement. However, the observed cross-lagged effects of engagement on comfort are the other way around, that is, the more engaged groups feel at T2, the more comfort they experience at T3. We also observed a similar cross-lagged effect among teachers in Study 1. It seems that after feeling engaged in an activity, feelings of comfort and relaxation are experienced, but when feelings of comfort are experienced first, then less engagement in the activity is accomplished over time.

Regarding the three positive affects considered in this research, results also suggest that enthusiasm displays the most predictive power and relates more strongly to efficacy beliefs and engagement, both concurrently and longitudinally, in the two studies. Among teachers (Study 1), self-efficacy predicts engagement indirectly via enthusiasm, and engagement also predicts self-efficacy over time. Moreover, we observed a significant rise in self-efficacy among teachers from T1 to T2, which may suggest the potential existence of a gain spiral. Feeling self-efficacious makes teachers feel good (they experience positive affect such as enthusiasm) and heightens their work engagement (vigor, dedication, and absorption), which in turn increases their levels of efficacy beliefs over time. So far, the findings partially support our Hypotheses 1 and 3. We expected a positive gain cycle (Study 1) and gain spiral (Study 2) of efficacy beliefs and engagement to exist over time via positive affect. More specifically, we expected feeling efficacious at T1 to increase levels of positive affect at T2, which in turn would increase engagement levels at T2 and T3. Furthermore, we expected engagement in turn to increase efficacy levels over time. Our findings show that a positive gain cycle and gain spiral of efficacy beliefs exists, but not for each of the three positive affects (enthusiasm, satisfaction, and comfort), and for activity engagement. For example, we observed significant increases in efficacy beliefs (self-efficacy and collective perceived efficacy) as well as increases in satisfaction and comfort in both studies, but not for enthusiasm, vigor, and dedication in either of the two studies.

It is interesting to notice that in the present study, the indicators of collective efficacy, collective emotions, and collective engagement were tested at the individual level (i.e. the individual perception of collective constructs). As a matter of fact, additional analyses (correlations and repeated measures MANOVAs) using aggregated data at the team level ($N = 19$) showed a considerably stronger association between collective efficacy, collective positive emotions, and collective engagement at the team level as compared with

the individual level, as well as significant linear trends in the intra-subject contrasts in collective efficacy, satisfaction, and comfort, and significant quadratic trends in absorption at both the individual and the collective levels of analyses.

Theoretical Contribution

Our results extend the SCT because they further specify the *kinds* of affective and motivational states that play a major role as sources of efficacy beliefs (specifically as far as the "fourth source" of self-efficacy—positive affective states—is concerned). Apparently, the affect at the highest level of activation (enthusiasm) has the strongest consistent effect on efficacy beliefs. In the laboratory study (Study 2), we also found a tentative gain spiral for efficacy beliefs. As Lindsley et al. (1995) stressed, it is necessary to test spirals in longitudinal research with at least three waves, which is the case in Study 2. Moreover, other conditions (such as positive reciprocal relationships among variables and an increase in the levels of variables over time) have to be met in order to prove the existence of a gain spiral. The results of our laboratory study confirm a tentative dynamic gain spiral of collective efficacy beliefs because the changes from T1 to T2 to T3 are significant and show a steady increment in efficacy beliefs over time, in both levels of analysis (i.e. individual perceptions and collective levels). Moreover, efficacy beliefs have a short-term cross-lagged impact on enthusiasm and a longer-term effect on enthusiasm and comfort. Enthusiasm also has a short-term effect on efficacy beliefs and shows positive reciprocal causation dynamics. Finally, efficacy beliefs have a positive direct impact on engagement and an indirect impact via enthusiasm (longitudinally). Collectively, the more efficacious groups feel more enthusiastic and they experience, in turn, more engagement over time.

Furthermore, our results suggest that a positive gain cycle and a gain spiral are also in line with former research on positive moods and emotions which showed that these positive constructs facilitate approach behavior, which in turn prompts people to engage in particular behaviors (Cacioppo et al., 1999; Carver & Scheier, 1990; Clore, 1994; Fredrickson, 2002). Our findings of reciprocal relationships between positive affect and engagement among teachers (Study 1) support the notion of dynamic gain cycles. In these cycles, positive affect (especially enthusiasm and, to a somewhat lesser extent, satisfaction) enhances engagement, which in turn enhances efficacy beliefs over time, and so forth (see also Fredrickson, 2002).

In accordance with the reciprocal causal nature of efficacy beliefs, we also expected affective and motivational processes and efficacy beliefs to relate bi-directionally, both synchronically and longitudinally. For example, as Bandura (1997) argued, despondency may reduce efficacy beliefs; low levels of beliefs decrease motivation and breed even deeper despondency, thus

perpetuating a "downward cycle". For instance, in both Study 1 and Study 2, efficacy beliefs have a positive impact on activity engagement (and positive affect), which in turn enhances efficacy beliefs over a longer time frame, thus triggering a positive gain cycle. In the present study, we tested for this positive cycle among teachers in Study 1, where efficacy beliefs increased significantly between two time points. In addition, we also tested a positive spiral among students working in groups in Study 2, which was conducted using a three-wave longitudinal design.

Implications for Future Research and for Practice

It is important for future research to examine whether efficacy beliefs and activity engagement also relate to other positive affective states (joy, happiness). At the same time it must also investigate the distinct, differential power of the various sources of self-efficacy (master experiences, vicarious experiences, social persuasion, and emotional/affect) on self-efficacy as well as the dynamic and reciprocal relationships among self-efficacy, affect, engagement, and performance over time. Moreover, future studies may choose different time lags to examine these relationships, for example, to address longer-term associations in longitudinal studies with time lags of several months. It would also prove interesting to study these gain spirals with more than three waves in order to test whether our findings can be replicated in the form of virtuous spirals over time, as recommended by Lindsley et al. (1995).

Our findings also indicate promising directions for interventions to increase efficacy beliefs among employees and working groups. These include practical exercises to promote positive affect (managing affect). According to Bandura (1999), in order to achieve resilient efficacy beliefs, it is necessary to study experiences in overcoming obstacles through persistent effort. People and groups rely on their affect or emotional states to evaluate their own capabilities to do things. Negative emotions and moods, such as tension, anxiety, and depression, are signs of personal and group deficiency, but positive emotions and affects could motivate behavior in a more engaged attitude to job tasks. In this area, training on emotional intelligence at work (individually and working in teams) could be an interesting area in order to increase levels of positive emotions, engagement, and feelings of efficacy at the workplace. Just feeling ready, willing and able!

Weaknesses and Strengths of the Study

One weakness of this study is the use of self-report measures. However, given the nature of this study, which includes covert psychological phenomena such as beliefs, affects, and motivation, we cannot employ objective data. However,

we did check the potential impact of common method variance in our data (see Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). Although we cannot completely rule out the possibility that the common method variance bias is playing a role, our check for common method variance proved negative.

On the other hand, our study has the following strengths: (1) the use of longitudinal research designs that test the cross-lagged effects between two or three waves; (2) the separate testing of the measurement and the structural models; (3) the use of different research designs: field and laboratory studies; (4) the inclusion of two independent samples that allow the results to be cross-validated; and (5) testing of similar models that include individual and group constructs. The fact that our results are quite similar across different samples, research designs, and individuals and groups illustrates the robustness of our findings. In addition, the similarity of the results across the fieldwork and laboratory studies also indicates ecological validity.

Final Note

To summarise, the current study shows that efficacy beliefs have an indirect impact on activity engagement via positive affect, especially enthusiasm, in two different samples (secondary school teachers and university students working in groups). In addition, the results show the existence of a gain cycle of self-efficacy, job enthusiasm, and work engagement over time, as well as a tentative gain spiral of collective efficacy beliefs, collective enthusiasm, and satisfaction, and collective task engagement over time. Hence this study contributes to our understanding of how the positive regulatory affective and motivational mechanisms of efficacy beliefs operate over time.

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