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ON TEAMS

What Makes Creative Teams Tick?

Cohesion, Engagement and Performance across Creativity Tasks: A three wave study.

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Abstract

The present study proposes a research model to examine the mediational mechanism of collective engagement in the relationship between team cohesion and team creative performance. A reciprocal process was expected to unfold across creativity task episodes: (1) team cohesion leads to collective task engagement which in turn has a positive effect on team creative performance (perceived team performance and independently rated creativity), and (2) perceived team creative performance predicts the development of future team cohesion. The study relied on a three-wave longitudinal organizational simulation exercise, in which 118 project teams (605 individuals) conducted three creativity tasks. This study advances collective task engagement as a crucial mediational process underlying a team's performance on creative activities.

Keywords:

Team cohesion; Collective task engagement; Team creative performance; Reciprocal process

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Organizations striving to keep their position in a global and competitive market are under constant pressure to make the right decisions, to expand their business and to come up with new and exciting products and services. Consequently, such organizations are highly in need of effective working strategies that may help them to cope with the extremely demanding environment in which they have to operate. The response to the pressures exerted by this dramatically changing environment is creativity. Creativity has been advanced as a key element for organizational effectiveness (Amabile, 1988; Baer & Oldham, 2006; George, 1990). For instance, Google, which has become the golden standard for organizational success, advocates the importance of hiring creative people and facilitating a creative atmosphere at work. According to Ed Catmull (2008), president of Pixar Animation Studios, success is not a matter of luck, but a combination of practices for managing talent and creating collective creativity. What these kind of successful organizations have in common is their reliance on practices to trigger and develop creativity among their employees and teams. In fact, teams are increasingly being used as the basic unit of work accomplishment (Hirschfeld & Bernerth, 2008) and therefore, the basis for organizational success. Hence, understanding how to enhance creativity among teams is a key issue both for business and research.

During the past decades, creativity research has grown exponentially and provided numerous insights on how individual employee creativity can be fostered (Amabile, Conti, Coon, Lazenby, & Herron, 1996); and more recently, how team creativity can be enhanced (Joo et al. 2012). Hence, given the increasing reliance of organizations on project based teams - that is, temporary teams that are assigned to work on a specific task during short amounts of time- to rapidly produce creative

outcomes (Gersick, 1988), research has also taken important steps towards a better understanding of psychosocial processes leading to team-level creativity (Eisenbeiss, Van Knippenberg, & Boerner, 2008). In fact, a meta-analysis spanning 30 years of creativity and innovation research (Hülsheger, Anderson, & Salgado 2009) revealed that team process variables (i.e. internal communication, team cohesion and vision) displayed stronger links with creativity than team input variables (i.e. team size, team longevity and background diversity) did. Moreover, team process variables appeared to be more strongly related to team creativity than to individual creativity.

There is a growing interest among researchers to investigate team process variables, due to their impact on creativity and innovation (Choi, Sung, Lee, & Cho, 2011; Hu & Randel, 2014; Jia, Shaw, Tsui & Park, 2014; Sung & Choi, 2012). Particularly, recent research highlights the idea that social integration processes within teams, such as team cohesion, are important for creative and innovative activities as they stimulate team members to interact with each other (Hülsheger, et al., 2009; Taggar, 2002). Given that diverse climatic variables influence creative processes at different stages of the innovation process (Somech & Drach-Zahavy, 2013), understanding the dynamics of social processes in team creativity is crucial for research and practice. To note, it seems that the relationship between cohesion and creative performance is based on a sort of indirect relationship (Hülsheger, et al., 2009; Taggar, 2002). However, this relationship still remains unclear and two relevant questions on this regard still need to be addressed. On the one hand, the factors contributing to the relationship between cohesion and team creative performance need to be tackled. On the other hand, how long does social cohesion take to develop? Little is known about this, especially with regards to project teams (Nakata & Im, 2010). In fact, notably few

studies have examined within-team innovation processes as they unfold over time (Anderson, Potocnik, & Zhou, 2014, p. 24).

In addressing the former questions, we propose a three-wave study to test the relationship between team cohesion and team creative performance over time. More specifically, we test the mediating role of team engagement (i.e., vigor, dedication, and absorption) as a key motivational mechanism that transmits the effects of team cohesion to team creative performance during specific task-episodes. Furthermore, in order to understand the dynamics of this relationship over time, we test a reciprocal cycle of cohesion and team creative performance across subsequent task episodes. According to Mathieu and Button (1992), we define episodes as distinguishable periods of time over which performance accrues. These task episodes are most easily identified by goals and goal accomplishment periods, and teams pursue just one of them at a time (Marks, Mathieu, & Zaccaro, 2001).

Thus, this study contributes to what we know about team creativity in different ways. First, we uncover the mechanisms that play a role in the team cohesion and team creative performance relationship; by studying the mediating role of team engagement. Hence, the present study provides a comprehensive theoretical framework that will help to identify new antecedents of team creativity in future research. Second, by adopting a longitudinal research model, we provide much needed insight on how team creativity develops over time (see for instance, call of Anderson et al., 2014; and call of Shin & Zhou, 2007). Finally, understanding these dynamics will help practitioners to design interventions to foster team creativity.

Theoretical background and hypotheses

In accordance with previous research, we conceive team creativity as the production of ideas concerning products or services that are novel and useful (Amabile, 1996; Shalley, 1991); team creativity emerges from cohesive team characteristics that support open interactions, diverse viewpoints and playful surroundings (Amabile, 1988). Team creativity should be differentiated from team innovation in the sense that creativity refers to the idea generation stage, while innovation also implies the introduction and application in a team of ideas, processes, products, or procedures that are new to the team and are designed to be useful (West & Farr, 1990).

Understanding team processes that lead to team creativity is one of the recent interests in creativity research (Anderson et al., 2014). In their meta-analysis, Hülshager, Anderson and Salgado (2009) found that team process variables (e.g. team cohesion) were relevant for team innovation. Team cohesion refers to the extent to which team members are committed to their team, and how well the team is integrated as it pursues its goals (Kozlowski & Ilgen, 2006). Team members who have strong feelings of belongingness and feel attached to other team members are more likely to cooperate, interact with each other, and exchange ideas (Taggar, 2002). Therefore, the positive effects of team cohesion are partially attributed to their impact on team member motivation to engage in creative activities. Although the existence of the link between team cohesion and team creativity has already been empirically demonstrated (e.g. Joo et al. 2012), the mechanisms through which this relationship occur are unclear, suggesting there is a mediational mechanism underlying such connection. In other words, cohesive teams per se do not achieve creative performance directly. In fact, strong levels of team cohesion could even lead to a decrease on performance by means of groupthinking and conformity processes (Paskevich, Estabrooks, Brawley, & Carron, 2001). Therefore, in order to achieve creative performance among cohesive teams, it is

necessary to uncover a meditational mechanism based on the persistence of the team to accomplish the task at hand, the energy necessary to achieve the goals, the feelings of inspiration and the implication of team members. In this sense, we advance collective task engagement as a meditational mechanism that may explain the relationship between team cohesion and team creativity.

In order to uncover and explain the relationships between team cohesion and team creativity, we draw upon the Job Demands-Resources model (JD-R model) (Bakker & Demerouti, 2007; Crawford, LePine, & Rich, 2010; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004). JD-R posits that employees' psychological states and consequently their work performance (in our case team creative performance) are determined by the extent to which individuals have work-related resources (in our case team cohesion) at their disposal. In this sense, social resources are considered to be important as they allow teams to increase their productivity (Van Emmerik & Brenninkmeijer, 2009) and team innovation (Hu & Randel, 2014). More specifically, team social resources refer to several aspects of team functioning that emerge from interpersonal dynamics between team members and from which teams can benefit in terms of overall performance and behavioral action (Oh, Chung, & Labianca, 2004).

According to the JD-R model, social resources instigate positive emotions and foster an affective motivational state among employees, called work or task engagement, which in turn has an impact on performance. In this sense, collective task engagement is defined as a positive, fulfilling, work-related shared motivational state that is characterized by team vigor, team dedication, and team absorption which emerges from the interaction and shared experiences of members of a workgroup (Costa, Passos, & Bakker, 2014; Salanova, Llorens, Cifre, Martinez, & Schaufeli,

2003). Vigor refers to the energetic component of task engagement that implies strong levels of energy and mental resilience while working, putting a great deal of effort into a team task and to persist, even when difficulties might occur. Dedication stands for the involvement in a team task by experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. The third dimension of collective task engagement is absorption, which refers to the full immersion in one's work. People who feel absorbed in their activities or tasks, experience that time passes more quickly and find it hard to detach themselves from their work (Schaufeli, Bakker, & Salanova, 2006).

JD-R model has been successfully employed in predicting the motivational impact of job-related resources and creativity at the individual level (e.g., Bakker & Xanthopoulou, 2013; Daniels et al., 2013). Although there is a lack of empirical evidence of this relationship at the team level, recent research has highlighted the functional equivalence of individual work engagement and team work engagement; thus both fostering individuals' and teams' performance and effectiveness (Costa et al., 2014). According to this, we will use the JD-R model to frame and develop our hypotheses at the team level. In so doing, we suggest that team resources may account for the social processes that are crucial during team creativity task episodes. To this regard, there is some preliminary evidence supporting the role of collective task engagement as a psychological mechanism affecting team performance. Salanova, Agut and Peiró (2005) demonstrated that work units' work engagement mediated the relationship between organizational resources and service climate, which in turn influenced collectively appraised employee performance and customer loyalty in the service sector.

In furtherance of the former rationales and due to the demanding nature of creativity tasks, we argue that collective task engagement will be particularly important

for the performance of teams charged with creativity tasks. Creativity tasks require sizeable cognitive flexibility, effort and persistence, as new approaches have to be explored in order to find an adequate solution for a specific problem. Drawbacks or difficulties are likely to be encountered during such activities, and thus, the success of creative teams strongly depends on their ability to surmount these obstacles. Persistent team vigor, dedication, and absorption should be crucial characteristics of teams that stay focused on their efforts to cope with obstacles (Zhou, 1998). In addition, as task engagement refers to the experience of a positive state of affective and motivational fulfillment at work, this should facilitate experimenting, trying out new behavioral strategies and thus, stimulate creativity.

In this sense, we argue that team cohesion will act as a team social resource by lubricating social interactions. Therefore, these social interactions may make people more prone to share their own resources in order to stay engaged on the task at hand, and in turns leading to creative performance. Therefore we propose:

Hypothesis 1: Throughout the course of a creativity task episode, team cohesion positively relates to team creative performance by means of team task engagement.

Thus far, we have proposed an indirect effect of team social resources on team creative performance by integrating collective task engagement as an underlying mechanism throughout the course of a specific creativity task episode. However, work-related resources (e.g., cognitive, motivational or behavioral) do not exist in isolation, but are dynamic and evolve as teams engage in various tasks or activities over time (Marks et al., 2001). In fact, previous research has raised some ambiguity regarding the direction of relationship between social resources (e.g., team cohesion) and team performance; suggesting that these constructs might be reciprocally related with each

other (Kozlowski & Ilgen, 2006; Mullen & Copper, 1994). This may be especially true for project teams or temporary teams, which have scarce references of past experiences as a team. Hence, the perceived immediate success on previous tasks may be one of the main predictors of future team social resource development, as other common experiences are lacking.

In the present study, we expect a mutual effect of team creative performance on future team cohesion. It is our contention that collective perceptions of having successfully performed a creativity task will influence the development of future team cohesion. Team members who perceive that they performed well as a team on a creativity task, will gain confidence in their team members and accordingly, are expected to increasingly rely on the competencies and abilities of their team. This should be beneficial for the social integration of team members and thus enhance the development of future team cohesion as team members will be more likely to collaborate and help each other during subsequent task episodes. In other words, cohesive teams should be able to use their teams' resources more efficiently because they know their other team members better and are motivated to complete the task successfully (Beal, Cohen, Burke, & McLendon, 2003). This reasoning is supported by different principles. First, the input-mediator-output-input framework or IMOI (Ilgen, Hollenbeck, Johnson, & Jundt, 2005) consider team processes and emergent states as mediating mechanisms between team inputs and team outputs. In this sense, teams go through a series of IMOI iterative episodes over time where the outputs of one episode may become inputs of subsequent ones. Along this idea lies the second principle focused on team regulation. That principle describes team performance as a dynamic and cyclic process where team actions are directed toward the accomplishment of specific goals; where team social resources are allocated to optimal teamwork; and

progress perceptions lead to the revision of subsequent effort investment and the adaption of working strategies in order to resolve the discrepancy between goals and performance (Kozlowski & Ilgen, 2006). In this regard, perceptions of success (i.e., mastery experiences) are said to affect subsequent task performance as it shapes the development of resources such as efficacy beliefs (Bandura, 1997). This line of thought is also consistent with Conservation of Resources theory (COR; Hobfoll, 2001), which argues that people not solely tend to protect their current resources (i.e., personal, social or environmental) but also constantly strive to accumulate and develop new resources which results in resource caravans (Xanthopoulou et al., 2009). In other words, cohesive teams will engage in the task in order to perform well, and in turn they will invest in their present resources (for instance, increasing the relationships or communication with the team members) to develop new resources.

Hence, we expect that teams who perceive to have performed well during a specific creativity task episode, are more likely to further develop their social resources (i.e., strong team cohesion) which will in turn, be beneficial for team creative performance during a subsequent task episode.

Hypothesis 2: Perceived team performance on a creativity task positively relates to the development of future team cohesion at a subsequent task episode.

Method

Sample and procedure

The present study adopted a three-wave design, involving 605 individuals participating in an organizational simulation exercise that consisted of three different team creativity tasks. Participants were recruited through a webpage built for this

purpose and also through advertising at university panels. Each participant received a financial reward (20 €) for taking part in the three tasks. A heterogeneous sample was composed with university students (71.6%) from different degrees (Psychology, Languages, Economics, Law, Design, Engineering, etc.), full time workers (16.8%) from a wide range of occupations, and unemployed people (11.6%). Participants were randomly assigned to the final 118 teams that were similar in magnitude (i.e., four to six members each) and structure (i.e. similar combination of students, employed and unemployed people). 35.7 % of the participants were men and the average age was 25.3 year. Participants were told that the purpose of this study was to investigate how teams function in the context of a creativity project.

Each team was brought together during three laboratory sessions, one session per week during three consecutive weeks, to work on a creativity task. All teams were clearly explained that the goal of the tasks was aimed at achieving creative outcomes. Although all three tasks concerned a creativity assignment, the specific content of each task varied in order to avoid learning effects (Ziessler & Nattkemper, 2001). At time 1 (T1), teams were instructed that they were a team that worked for an organization that sells toys. Specifically, during the subsequent three sessions they would have to perform a team creativity task (i.e., in the sense that their output had to be novel and adequate) and that they would have 40 minutes to complete their task. These instructions were repeated during each session. The first session (T1) comprised an idea generation task as teams had to come up with one creative slogan that promoted their organization. One week later (T2), teams came together to work on a second creativity task. Teams were instructed to develop a prototype of a “toy”, made out of recyclable materials (equal for all teams). One week later (T3), teams performed a final task and had to design a poster

that promoted their toy. After each task, participants were asked to complete a questionnaire that assessed the variables under study.

Measures

To note, we used validated scales well known in the literature, the reliability information (Cronbach alpha's) of the scales is presented in Table 1.

Team cohesion. We assessed 'team cohesion' by three items adopted from the scale of Price and Mueller (1986) (e.g., *'the task has been realized in an amicable and pleasant atmosphere'*). Items were answered on a 7-point Likert-scale going from 0 (never) to 6 (always).

Collective task engagement. We assessed "collective task engagement" (Salanova et al., 2003) by measuring three dimensions: Vigor (three items, e.g., *'during the realization of the task, my team felt full of energy'*), dedication (three items, e.g., *'my team was enthusiastic about the task'*), and absorption (three items, e.g., *'time flew when my team was working on the task'*). Items were answered on a 7-point Likert-scale going from 0 (never) to 6 (always).

In order to overcome limitations of past research (Tekleab et al., 2009) and answering the need of incorporate independent and objective outcome measures in creativity domain (Anderson et al., 2014), we measured **creative team performance** by means of two different measures: *perceived team performance* and *task output creativity*.

Perceived team performance. We assessed "perceived team performance" by three items adopted from the scale of Goodman & Svyantek (1999) (e.g., *'in my team,*

we achieved the goals of the task'). Items were answered on a 7-point Likert-scale going from 0 (totally disagree) to 6 (totally agree).

Task output creativity. We assessed the creativity of each task output based on the creativity assessment procedure of Baer and colleagues (2010). Specifically, team outputs of all creativity tasks were evaluated by three external coders: one expert judge (i.e., somebody with professional expertise concerning the particular creativity task) and two researchers (not involved in the study) who received creativity assessment training. Creativity was defined in terms of ideas that are both original and useful (Amabile, 1988). During the assessment training, the raters were instructed to individually assess the creativity of 3 randomly selected team task outputs (0 = "Not at all creative" to 6 = "highly creative"). After completing their individual evaluations, the raters compared their scores and discussed possible disagreements. In a second step, all three raters were instructed to independently score the creativity of each team task output. This procedure was repeated for each creativity task (i.e., T1: slogan, T2: toy, T3: poster). To construct the creativity score for each team task output, creativity ratings were averaged across the three coders. To examine whether aggregation across raters was justified (to obtain an aggregated score for task output creativity), in other words to assess interrater agreement, the intraclass correlation coefficient (ICC1 & ICC2; Bliese 2000) and RWG values (James, Demaree, & Wolf, 1984) were calculated. To note that, values that exceed .12 for ICC1 indicate an adequate level of within-unit agreement (James et al., 1984). For the ICC2, values higher than .60 are recommended by Glick (1985). Although some debate exists between the cut-off point of RWG, according to LeBreton and Senter (2007) values that range between .51 and .70 offer a moderate agreement and values between .71 to .90 offer strong agreement. In the present study, the average ICC1 value was .37, ranging from .29 (i.e., T2 creativity) to .44 (i.e., T3 creativity). The

average ICC2 value was .63, ranging from .55 (i.e., T2 creativity) to .70 (i.e., T3 creativity). The average RWG value was .71, ranging from .64 (i.e., T1 creativity) to .80 (i.e., T3 creativity). Taken together, all measures were acceptable, suggesting adequate levels of agreement, thereby justifying aggregation across the three raters (Bliese, 2000; LeBreton & Senter, 2007).

It should be noted that we do not hypothesize a cross-lagged association between the independently rated creativity scores and subsequent team social resources because task output creativity was assessed after having completed all three creativity tasks. Consequently, teams were not aware of their externally rated creativity scores during the simulation exercise and could therefore not have impacted their team cohesion at subsequent creativity task episodes.

Data analyses

We computed the means, standard deviations, Cronbach's alpha coefficients and bivariate correlations for all scales. First, as a preliminary step, we tested the measurement model. Following Caprara, Pastorelli, Regalia, Scabini, and Bandura (2005), Confirmatory Factor Analyses (CFA) were computed to differentiate the constructs of team cohesion, collective task engagement and perceived team performance. Three models were tested: (1) A one-factor model which hypothesized that the constructs were the expression of a single latent factor (i.e., all the covariances were fixed at 1); (2) An orthogonal model which assumed that constructs were independent of each other (i.e., all the covariances were fixed at 0); and (3) an oblique model which assumed that the factors interrelated (i.e., all the covariances were freely estimated). To test the longitudinal invariance of the model, we tested the models across the three tasks (i.e. Time 1, Time 2 and Time 3).

Second, in order to statistically justify the aggregation of the team members' survey responses to the team level (i.e., team cohesion, collective task engagement and perceived team performance), various indices were calculated; we used intraclass correlation coefficients (i.e., ICC1 and ICC2) and also within- group interrater agreement (i.e., RWG; James, Demaree, & Wolf, 1984).

Structural Equation Modeling (SEM) (using AMOS 19) was employed to test our hypothesized research model (see Figure 1). By means of a cross-lagged structural equation model, several competing models were fitted to the data in several steps. First, the *Stability Model* (M1) was tested without cross-lagged structural paths, but with temporal stabilities and synchronous correlations (i.e., including paths going from team cohesion to collective task engagement, from collective task engagement to perceived team performance, and from collective task engagement to task output creativity). Temporal stabilities were specified as correlations between the corresponding constructs at T1, T2 and T3. Second, the fit of this stability model was compared to four more complex models that were nearest in likelihood to the hypothesized structural model: (1) the *Causality Model* (M2), which is identical to M1 but includes additional cross-lagged structural paths from T1 team cohesion to T2 collective task engagement, to T2 perceived team performance and T2 task output creativity, from T1 collective task engagement to T2 perceived team performance and T2 task output creativity, as well as the same relationships between T2 to T3 variables; (2) the *Reversed Causation Model* (M3) which is also identical to M1, but includes additional cross-lagged structural paths from T1 perceived team performance to T2 collective task engagement and T2 team cohesion, and from T1 collective task engagement to T2 team cohesion, as well as the same relationships between T2 to T3 variables; the *Full Reciprocal Model* (M4), which includes reciprocal relationships among team cohesion, collective task engagement and

perceived team performance at three waves, therefore, includes all the paths of M2 and M3; the *Hypothesized Model* (M5) which is identical to M1, but also includes reciprocal relationships among team cohesion and perceived team performance at the three waves: namely a cross-lagged structural path going from T1 perceived team performance to T2 team cohesion, as well as a path going from T2 perceived team performance to T3 team cohesion (see Figure 1).

Model fit. Maximum likelihood estimation methods were used in order to test the different models. The goodness-of-fit of the models was evaluated, using absolute and relative indices. The absolute goodness-of-fit indices calculated were: the χ^2 Goodness-of-Fit Statistic, the relative χ^2 test, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA). Because χ^2 is sensitive to sample size, the probability of rejecting a hypothesised model increases when sample size also increases. To overcome this problem, the computation of relative goodness-of-fit indices is strongly recommended (Bentler, 1990). Following Marsh, Balla and Hau (1996), three such fit indices were computed: (1) the Comparative Fit Index (CFI); (2) the Incremental Fit Index (IFI); and (3) the Non-Normed Fit Index or Tucker-Lewis Index (TLI). Since the distribution of GFI and AGFI is unknown, no critical values exist. Values smaller than .08 for RMSEA are indicative of an acceptable fit, while values greater than 0.10 should lead to model rejection (Browne & Cudeck, 1993). As a rule of thumb, the values for CFI, IFI, and TLI greater than .90 are considered a good fit (Hoyle, 1995). Finally, we computed the Akaike Information Criterion index (AIC; Akaike, 1987) and the Expected Cross-Validation Index (ECVI) to compare competing models because it is particularly well suited for comparing the adequacy of non-nested models that fit to the same correlation

matrix. The lower the AIC and ECVI indices, the better the fit is. The various models were compared by means of the χ^2 difference test.

Split-sample test. The hypothesized model (M5) was re-tested using a split-sample design to reduce problems related to common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In line with Ostroff, Kinicki, and Clark (2002) and with Chun, Shin, and Kim (2013), we split each team in two subgroups of minimum 2 members each. Participants of subgroup A provided data on team cohesion and team perceived performance, and participants of subgroup B provided data on collective task engagement.

Results

Descriptives and aggregation analysis

Table 1 presents means, standard deviations, internal consistencies (Cronbach's alpha) and bivariate correlations of all variables in the study. All Cronbach's alpha coefficients meet the criterion value of .70 (i.e., ranging from .83 to .92).

Insert Table 1 here

Across all survey variables in the present study, the average ICC1 value was .22, ranging from .11 (i.e., perceived team performance T1) to .31 (i.e., perceived team performance T2). The average ICC2 value was .58, ranging from .39 (i.e., perceived team performance T1) to .70 (i.e., perceived team performance T2) and the average RWG value was .85, ranging from .85 (i.e., collective task engagement T1) to .91 (i.e., team cohesion T1). Although ICC1 and RWG values are in line with past research concerning data aggregation (e.g., James et al., 1984), the ICC2 values are quite low. However, Bliese (1998) delineated that ICC2 values are a function of ICC1 values and group size. Due to the relatively modest group size in the present study (i.e., only 4 to 6

members per group), ICC2 indices were somewhat lower in magnitude. Bliese argues that such lower reliability scores might weaken the relationships that are observed at the group level. Hence, given the satisfactory ICC1 and RWG values and taking the less than optimal ICC2 values into account, we proceeded to aggregate the survey variables of the present study.

Confirmatory factor analysis

Table 2 shows the results of the confirmatory factor analysis at the team member level of our measures among team cohesion, collective task engagement and perceived team performance for time 1, time 2 and time 3. The chi-square (χ^2) of all the models was statistically significant; the oblique model shows the best fit indices (see AIC; Akaike, 1987) and meet the criteria for the three sessions. These results confirm that team cohesion, collective task engagement and perceived task performance are interrelated variables but are distinct constructs.

Insert Table 2 here

Testing the hypothesized structural model

Table 3 shows the overall fit indices of the five competing models of our study. Results confirm the robustness of the *Hypothesized Model* (M5): " χ^2 (118) = 193.45, $p < .001$, IFI = .96, TLI = .95, CFI = .96, RMSEA = .074, AIC = 299.452, ECVI = 2.56". Moreover, M5 also shows superior fit compared to the four alternative models that were tested; namely the *Stability Model* (M1) [Delta χ^2 (9) = 72.10, $p < .001$; ECVI = 3.02], the *Causality Model* (M2) [Delta χ^2 (1) = 40.51, $p < .001$; ECVI = 2.92], the *Reversed Causality Model* (M3) [Delta χ^2 (3) = 59.25, $p < .001$; ECVI = 3.01] and the *Full Reciprocal Model* (M4) [Delta χ^2 (7) = 23.85, $p < .001$; ECVI = 2.85]. Structural path coefficients of the Hypothesized Model (M5) are presented in Figure 2.

Insert Table 3 here

The structural relationships of the Hypothesized Model (M5) reveal that team cohesion is positively related with collective task engagement at all three waves (supporting Hypothesis 1). More specifically, T1 team cohesion is positively related to T1 collective task engagement ($\beta = .64, p < .001$), T2 team cohesion is positively related to T2 collective task engagement ($\beta = .65, p < .001$) and T3 team social cohesion is positively related to T3 collective task engagement ($\beta = .64, p < .001$). Support was provided for Hypothesis 2a as we found a positive relationship between collective task engagement and perceived team performance at T1 ($\beta = .68, p < .001$), T2 ($\beta = .70, p < .001$) and T3 ($\beta = .66, p < .001$). Further, collective task engagement is also positively related to task output creativity but only at T2 ($\beta = .33, p < .001$) and T3 ($\beta = .22, p < .05$). At T1, the path going from collective task engagement to task output creativity did not appear to be significant (H2b partially supported). Additionally, in support of Hypothesis 3 regarding the reciprocal effect of perceived team performance on team cohesion, we observed significant cross lagged paths going from T1 perceived team performance to T2 team cohesion ($\beta = .23, p < .05$) and from T2 perceived team performance to T3 team cohesion ($\beta = .20, p < .05$).

Insert Figure 2 here

Finally, in order to verify the robustness of our findings, we re-tested the hypothesized model (M5) by adopting a split-sample design. More specifically, we relied on survey data from two different sources; subgroup A for team cohesion and perceived team performance, and subgroup B for collective task engagement. This split-sample test of the Hypothesized model provided satisfactory fit indices; " χ^2 (122) = 207.69, $p < .001$, IFI = .93, TLI = .91, CFI = .93, RMSEA = .08, AIC = 305.69, ECVI =

2.75". The structural relationships of this model were in line with the hypothesized model test using the entire sample. The only difference that could be observed when adopting a split-sample design is the cross-lagged relationship between T2 perceived task performance and T3 team cohesion. Contrary to what we found when using the entire sample, the second cross-lagged relationship of this relationship was not significant ($\beta = .15$, n.s.).

Discussion

In the present study, we have sought to uncover the mechanisms that play a role on the team cohesion and team creativity performance relationship, by proposing team engagement as a mediational mechanism explaining this relationship. In addition, we aimed to uncover the dynamics underlying the development of team cohesion, team engagement and team creativity performance across time. In so doing, we answer recent calls about the need for understanding the longitudinal functioning of team creativity (i.e. Anderson et al. 2014, and Shin & Zhou, 2007).

Generally, our hypotheses were supported as our findings indicate that cohesive teams are more likely to perform well on creativity tasks if the team is engaged with the task at hand. Hence, supporting H1 on the mediating role of team engagement.

Moreover, we also found a cross-lagged reciprocal relationship between perceived team performance and team cohesion. Specifically, teams that perceived to have performed well on a creativity task reported to experience stronger team cohesion at subsequent task episodes, thus supporting H2.

Theoretical implications

The present study extends existing theory on team cohesion, team engagement and team creativity in a number of ways. First, we address the ambiguous relationship between team cohesion and team creative performance existing in the literature (Hülshager, et al., 2009; Joo et al. 2012; Taggar, 2002). In this sense, we showed that team engagement plays a relevant role in the team cohesion – team creative performance connection. According to the JD-R framework (Bakker & Demerouti, 2007), this finding reinforces the idea that affective motivational states (in our case team engagement) acts as a hinge between social resources (i.e., team cohesion) and performance (i.e., team creative performance). Hence, the present study implies a step further in extant knowledge of engagement and creativity at the collective level, by providing empirical evidence on the mediating role of engagement in the team creative process. In doing so, we extended the study of engagement by being responsive to the need for additional empirical studies accounting for team level antecedents and consequences of team engagement (Costa et al., 2014). In this regard, our study examines both antecedents (team cohesion) and outcomes (team creative performance) of team engagement.

Second, our findings regarding how team creativity is fostered across time also tries to answer to the call of recent research on team creativity and innovation (Anderson et al., 2014). By adopting a three-wave design, we further extend current theory on the dynamic development of team social resources over a series of creativity task experiences. Specifically, across three subsequent task episodes, we observed cross-lagged effects of positive perceptions of team creative performance on future team resource development (team cohesion) and hence found that reciprocal gains arose between team cohesion and perceived team creative performance. This finding is also supported by input-mediator-output-input framework or IMOI (Ilgen et al. 2005). In a

similar vein, gain patterns have been found in team cohesion and performance literature (Beal et al. 2003). However the mediating role of engagement in explaining the cohesion - creative performance link adds novelty and value to the growing research on team's creativity dynamics.

On the other hand, our study also contributes to the research on team cohesion and performance outcomes regarding how performance is measured, as requested by Beal et al. (2003). In our study, apart from team members' perceptions of the team's performance on each creativity task, we also incorporated independently rated creativity scores of the team's task output. In doing so, we covered an existing problem in research on creativity, which has mainly relied on self-reports of both predictor and outcome variables which is a limitation of past research (Tekleab et al., 2009). This is problematic as Hülshager and colleagues (2009) demonstrated that if team-level processes are assessed by the same people who have rated their own performance, this inevitably leads to overestimated effect sizes. Therefore, we incorporated both types of measures of creative task performance; namely "perceived team performance" and "task output creativity", answering also the recent call of Anderson et al. (2014).

To note, that though it is usually recommended to exclusively rely on independent performance ratings because of the likelihood of method bias (e.g., Gully, Incalcaterra, Joshi, & Beaubien, 2002), this distinction of output was theoretically relevant for our research model. In this way, we hypothesized and found that shared perceptions of team performance on a creativity task (and hence reflecting a sense of mastery) fuel the development of future team social resources (i.e., and not the independently rated task output creativity as they were not shared with the teams). Moreover, independently rated task output creativity was obtained once the sessions were finished, so teams did not received any kind of feedback about their objective

performance during their participation in the study that could influence on the social resources. Furthermore, both types of team performance were positively related to collective task engagement. However, contrary to what was expected, collective task engagement was not related to output creativity at T1. An explanation for this non-significant relationship could be that collective task engagement did not immediately lead to actual creative output (i.e., rated by the external coders) as it was the first time that team members had to work together on a creativity task. This may have affected their creative performance in the sense that “new” teams who are involved in a creative activity and who experience higher notions of collective task engagement may perceive high performance; however this does not necessarily result in immediate creative output. Although substantial evidence has been found regarding the benefits that engagement may have for organizations (see Harter, Schmidt, & Hayes, 2002, for a meta-analysis), and the link between work engagement and task performance has been empirically validated (Christian, Garza, & Slaughter, 2011), these studies are based on the individual level. Therefore, research is needed to provide further empirical evidence to better understand how the relationship between team engagement and team performance takes shape over time, especially in newly formed teams. For instance questions regarding how much time or interaction is needed for the team to reach a proper performance still remain unsolved (Balkundi & Harrison, 2006). So the present study shows that associations between team work engagement and objective performance took more than one session to happen, showing indeed the dynamics of these relationships.

Finally, our study provides a step forward in the way collective constructs are operationalized. There is an open debate among team researchers (e. g. Costa et al. 2014; Kozlowski & Chao, 2012; Morgeson & Hofman, 1999) regarding how team

emergent constructs are treated, since some of collective research measures the collective constructs as the sum or average of individual ratings. In our case, we measured all the constructs considering the team as the referent and using the first-person plural (e.g. 'in my team, we achieved the goals of the tasks') as suggested by Costa et al. (2014). This provides us information beyond the individuals' own states, by taking the atmosphere of the team into account.

Practical implications

Our research results may be particularly interesting for organizations that aim to foster team and organizational creativity. To this regard, in fact, our findings indicate that team creativity benefits from team cohesion through its impact on collective task engagement. Hence, team-level interventions to stimulate team creativity should focus on the enhancement of team cohesion and team engagement (Schaufeli & Bakker, 2004). Moreover, engaged teams will provide organizations with a unique competitive advantage (Macey & Schneider, 2008) since organizations that understand the conditions that enhance team engagement will have accomplished something that competitors will find very difficult to imitate. Hence, promoting team-oriented policies and enhance team social resources will be the most efficient management behavior when team creative outcomes are required in an organization. In fact, as our results show, such interventions may also induce reciprocal gains between team cohesion and creative performance. Furthermore, organizations might consider working with self-managed teams as they require greater collaborative interaction, which leads to greater team cohesion (Seers, Petty, & Cashman, 1995).

Our results also indicate that teams who perceive to have performed well on a creativity task are more likely to develop their team cohesion in time. This implies that

tasks could be strategically ordered and adapted to initiate and reinforce these reciprocal dynamics. Teams that are assigned to carry out creative activities could start to work on a relative simple creativity task, which makes a successful performance more likely, boosting social resources. Then, as team social resources grow and take shape across subsequent task cycles, teams could gradually move to more complex creativity assignments.

Limitations and future avenues for research

Due to the relative complexity of our design, this study is not without limitations. First, we did not hypothesize a cross-lagged association between the independently rated creativity scores and subsequent team cohesion because objective task output creativity was assessed after having completed all three creativity tasks. Consequently, teams were not aware of their externally rated creativity scores during the simulation exercise and could therefore not have impacted their team cohesion at subsequent creativity task episodes. Therefore, a question arises regarding whether having real feedback and differential consequences (i.e. resources for next action phase) from each task have influence on future team cohesion or not. Although developmental feedback is positively related to team creativity (Joo et al. 2012), further research should address the role of feedback on team cohesion and team engagement across time.

Second, by relying on the JD-R model as a guiding framework, we advance theoretical understanding of how team engagement affects the relationship between team cohesion and creativity during specific task episodes. In this way, we aimed to establish a theoretical foundation for future research on team-level antecedents of collective task engagement and team creativity. However, there are other possible and relevant antecedents related to social resources in teams such as collective efficacy.

Collective efficacy influences what team members choose to do as a team, the amount of effort they exert, and their perseverance in the face of challenges or failure to produce results (Bandura, 2000). In our study we did not include this antecedent due to study design reasons, but further research should include it in order to know its role on creativity across time.

As an additional future avenue for research, the current model may be expanded by introducing moderators to further explore the dynamic development of team cohesion over time. For example, environmental factors (e.g., creativity support) or leadership styles (Zaccaro, Rittman & Marks, 2001) (e.g., directive vs. participative) may moderate the effects of creative performance on team cohesion and vice versa. Thus, such a line of research will provide a better insight about the specific circumstances where reciprocal gains between team social resources and team creative performance are more likely to arise.

Further, in our study design we used three different creativity tasks to avoid learning effects among participants. Although all three tasks concerned a creative activity, team output differed across the three tasks what may have had implications on how the team output was evaluated across the three tasks. However, given the fact that we found similar effects across the three tasks, the study attests to the robustness of our hypothesized model. Beyond analyzing only the creativity process, future research could test the stability of the causal link team cohesion – team engagement – team creative performance also in the implementation stage, thus, covering also the entire innovation process, such complementing recent research on innovation (Somech & Drach-Zahavy, 2013).

Finally, the present study relied on an organizational simulation exercise that was conducted in a controlled setting which yields some benefits but also pitfalls. The main benefit concerns the possibility to compose relative similar teams, and the fact that independent raters could assess the creativity level of each team output. Although the realistic nature of the simulation task, measures were obtained from laboratory teams and not from field teams in organizations. This hypothetical nature of the tasks is a concern to external validity and also reliability (Karren & Barringer, 2002). In that sense, the teams had not any informal contact between the sessions, since they did not have any link beyond the laboratory study, which could offer new inputs to the process as in field teams may occur. Related to the composition of the teams, although we tried to have heterogeneous teams, we assume that the percentage of students (71.6%) was superior as expected. This may be due to the university context in which the study was carried out, participants were recruited through a webpage and advertising at university panels. Hence, most of the team members were students. Notwithstanding, this does not necessarily imply that the findings of the present study are less relevant for organizations as they also frequently rely on project based teams with members that previously did not work together in order to carry out specific creative activities. In fact, we tried to use realistically defined instructions and situations, designing scenarios close to participant's environment, as suggested by Karren and Barringer (2002). In sum, additional research could seek to replicate these findings using a field study design in order to guarantee the external validity of our findings.

Conclusion

We can conclude that the relationship between team social processes and team creativity is complex and should be studied longitudinally in order to capture the subtleties of its dynamic nature. The present study advances collective task engagement

as a crucial motivational process underlying a team's performance on a creativity task.

Our findings suggest that organizations can facilitate collective task engagement and team creativity and even initiate reciprocal gains by stimulating specific team social resources such as team cohesion.

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Table 1

Descriptive statistics, correlation coefficients and Cronbach's α

<i>Variables</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1.Team Cohesion T1	5.54	0.34	(.83)										
2.Team Cohesion T2	5.45	0.53	.38**	(.90)									
3.Team Cohesion T3	5.34	0.54	.33**	.58**	(.92)								
4.Collective Task Engagement T1	5.00	0.48	.61**	.34**	.27**	(.91)							
5. Collective Task Engagement T2	5.24	0.50	.43**	.75**	.48**	.56**							
6. Collective Task Engagement T3	5.10	0.56	.32**	.46**	.73**	.43**	.57**	(.87)					
7.Perceived Team Performance T1	5.22	0.39	.55**	.38**	.41**	.67**	.49**	.43**	(.88)				
8. Perceived Team Performance T2	5.02	0.60	.34**	.68**	.47**	.48**	.78**	.58**	.59**	(.90)			
9. Perceived Team Performance T3	5.04	0.58	.41**	.59**	.75**	.42**	.67**	.86**	.57**	.72**	N.A.		
10. Task Output Creativity T1	3.11	1.08	.11	.12	.11	.10	.12	.09	.07	.13	.12	N.A.	
11. Task Output Creativity T2	2.98	0.84	.13	.15	.09	.25**	.33**	.23*	.09	.22*	.18*	-.03	N.A.
12. Task Output Creativity T3	3.27	1.08	.08	.31**	.18†	.10	.47**	.25**	.10	.31**	.27**	.06	.14

Note. $N = 118$. Internal correlations are presented at the team level. Internal consistency values (Cronbach's α coefficients) appear across the diagonal in parentheses. N.A. = not applicable. T1 = Creativity task 1, T2 = Creativity task 2, T3 = Creativity task 3.

† $p < .10$; * $p < .05$; ** $p < .01$.

Table 2

Fit indices of confirmatory factor analyses (N=605) for Time 1, Time 2 and Time 3 variables.

<i>Models</i>	χ^2	<i>df</i>	GFI	AGFI	RMSEA	CFI	IFI	TLI	AIC
1. Unique factor model T1/T2/T3	429.76/ 430.42/ 355.32	81	.93/.92/.93	.90/.88/.90	.08/.07/.07	.94/.95/.97	.94/.95/.97	.92/.94/.96	507.76/508.33/433.27
2. Orthogonal model T1/T2/T3	644.23/846.19/898.71	81	.88 /.87/.87	.82/.81/.84	.11/.12/.13	.90/.89/.90	.90/.89/.90	.87/.86/.87	722.23/924.19/976.71
3. Oblique model T1/T2/T3	168.77/243.65/194.44	78	.97/.96/.97	.95/.93/.94	.04/.05/.04	.99/.99/.99	.98/.97/.98	.98/.97/.98	252.77/327.65/278.44

Note. 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.

Table 3

Fit of the alternative research models (N=118)

<i>Models</i>	χ^2	<i>df</i>	χ^2/df	GFI	AGFI	RMSEA	CFI	IFI	TLI	AIC	ECVI	Difference test
M1. Stability	265.55	127	2.09	.80	.73	.10	.93	.93	.91	353.55	3.02	
M2. Causality	233.96	117	2.00	.82	.74	.09	.94	.94	.92	341.96	2.92	a = 31.59(10)***
M3. Reversed	252.70	121	2.09	.81	.73	.10	.93	.93	.91	352.70	3.01	a = 12.85(6) a = 18.74(4)***
M4. Full Reciprocal	217.30	111	1.96	.83	.74	.09	.94	.94	.92	333.39	2.85	a = 48.25(16)*** a = 18.74(6)*** a = 35.40(10)***
M5. Hypothesized	193.45	1118	1.64	.85	.78	.07	.96	.96	.95	299.45	2.56	a = 72.10(9)*** a = 40.51(1)*** a = 59.25(3)*** a = 23.85(7)***

Note. 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; ECVI = Expected Cross-Validation Index. ** $p < .01$

*** $p < .001$; a = Chi-square differences.

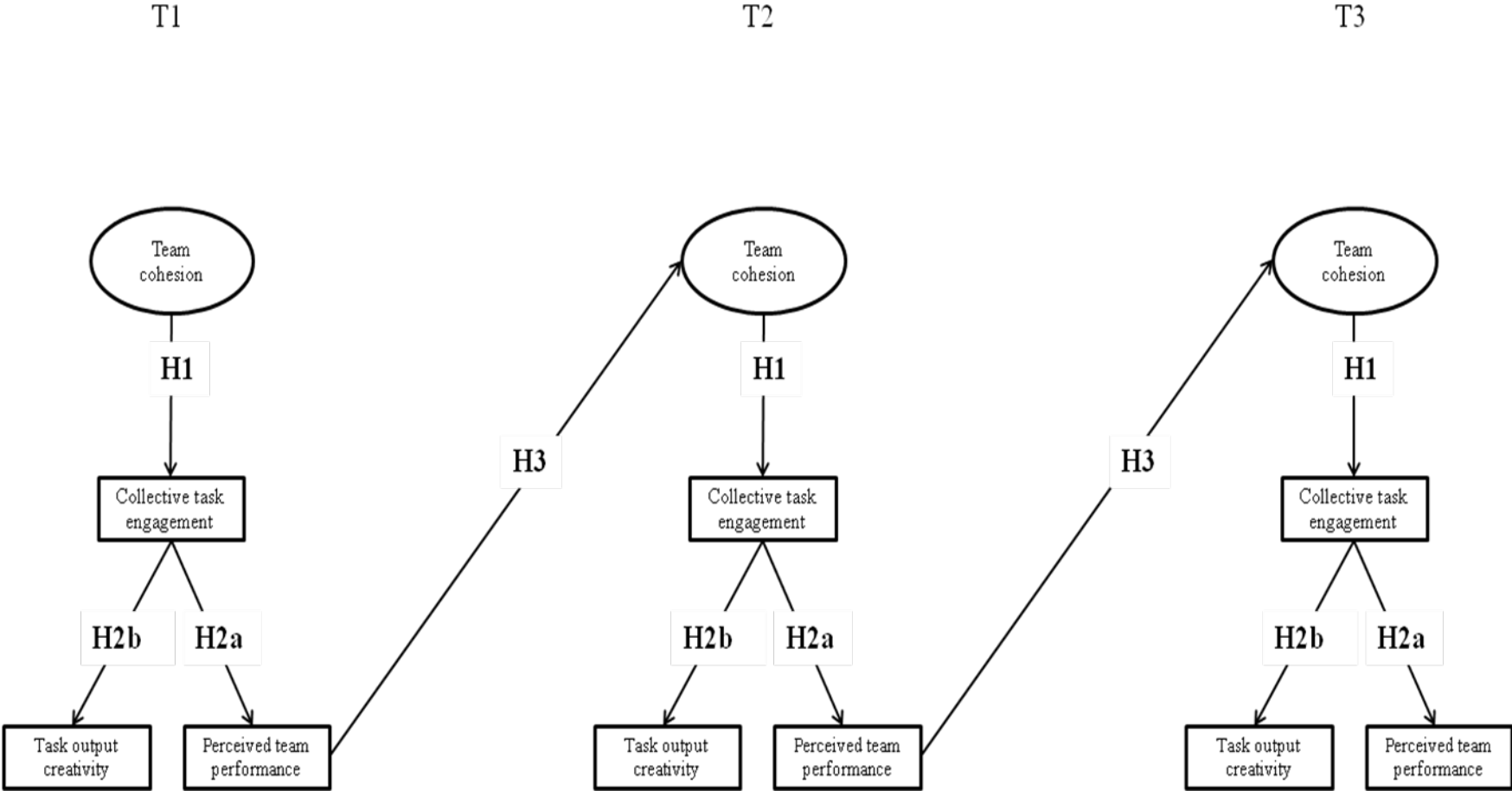


Figure 1. Hypothesized research model

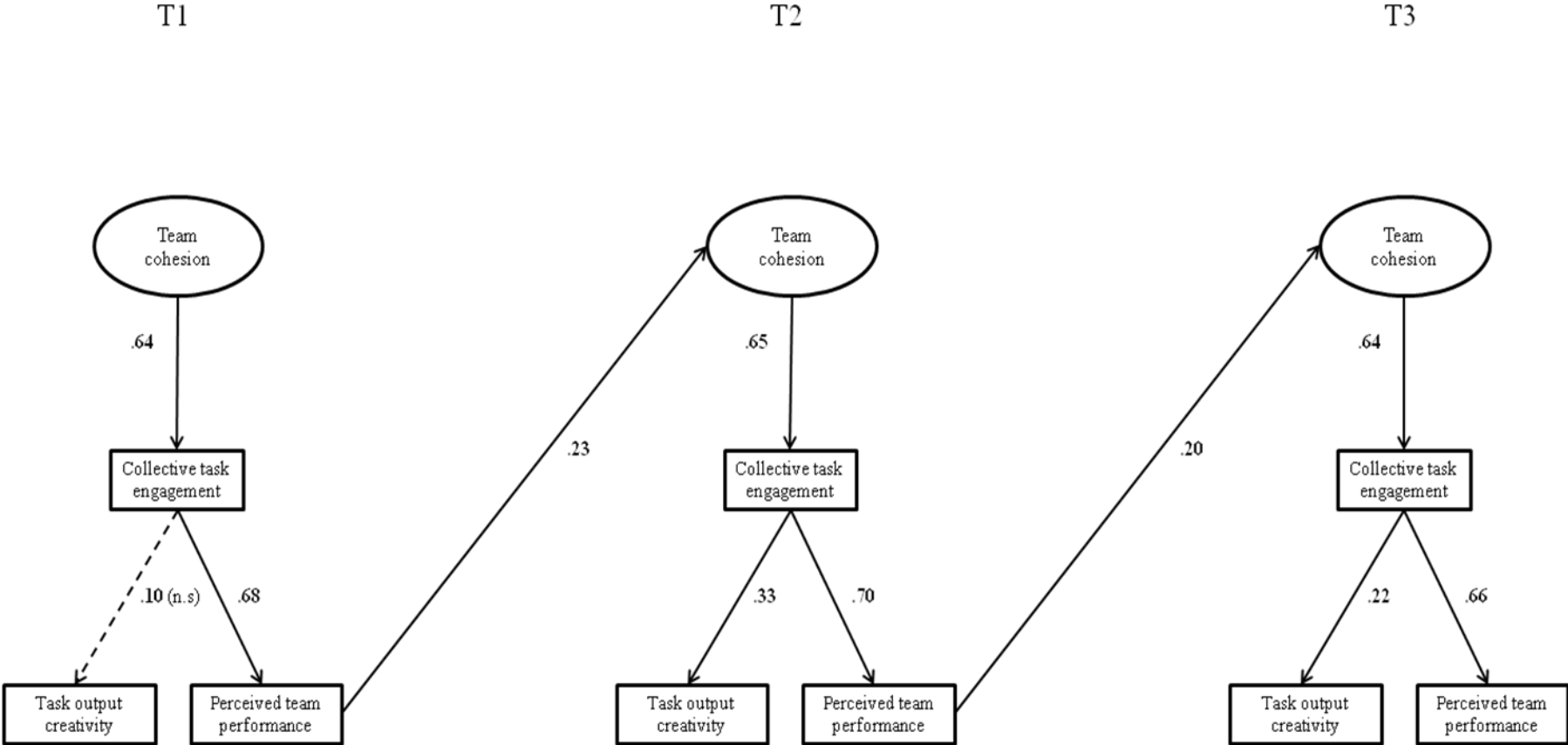


Figure 2. Structural path coefficients of the hypothesized model (M5). The hypothesized model controls for the temporal stability between all measures. T1 = Creativity task 1, T2 = Creativity task 2, T3 = Creativity task 3.

