SBPOT

Revista Psicologia: Organizações e Trabalho

ISSN 1984-6657 • doi: 10.17652/rpot/2017.4.13712

rPOT Revista Psicologia: Organizações & Trabalho

How complexity leadership and cohesion influence team effectiveness

Luís Curral[1,a], Paulo Leitão[a], Catarina Gomes[a,b], Pedro Marques-Quinteiro[c], Pedro Lind[d]

CICPSI, Faculdade de Psicologia, Universidade de Lisboa, Lisboa, Portugal[a], Centro de Administração e Políticas Públicas, Instituo Superior de Ciências Sociais e Políticas, Universidade de Lisboa, Lisboa, Portugal[b], William James Center for Research, ISPA- Instituto Universitário, Lisboa, Portugal[c], Physics Department, University of Osnabrück, Barbarastrasse, Osnabrück, Germany[d]

Keywords:
group cohesion;
leadership;
performance.

Abstract

This research tested the hypothesis that enabling leadership behaviors are positively related to the objective and subjective dimensions of teamwork effectiveness. Hypotheses testing was done during a laboratory task in which 40 teams of 5 people each (N = 200) engaged in a simulation task using the pc game SimCity4. The results suggest that enabling leadership and task cohesion are not related to team performance, R2 = .08, MSE = 1.02, F(4, 35) = .79, p = .54; and that enabling leadership is positively related to team viability, mediated by task cohesion, R2 = .71, MSE = 0.31, F(4, 35) = 21.87, p < .001. These findings also suggest that engaging in enabling leadership behaviors promotes team member commitment to a shared goal, which in turn enhances the shared perception that the team has the necessary conditions to keep working together on future assignments.

Como a liderança de complexidade e a coesão influenciam a eficácia das equipes.

Palavras-chave:
coesão de grupo;
liderança;
desempenho.

Resumo

Esta investigação testou a hipótese de que os comportamentos de facilitação estão positivamente relacionados com as dimensões objetiva e subjetiva da eficácia das equipas de trabalho. Participaram neste estudo 40 equipas de 5 elementos (N = 200), onde se utilizou o jogo de computador SimCity4. A análise dos efeitos diretos e indiretos sugere que os comportamentos de facilitação e a coesão de tarefa não se relacionam com o desempenho, R2 = .08, M.S.E = 1.02, F(4, 35) = .79, p = .54; e que a coesão de tarefa medeia a relação entre comportamentos de facilitação e a viabilidade, R2 = .71, MSE = 0.31, F(4, 35) = 21.87, p < .001. Estes resultados sugerem que a prática de comportamentos de facilitação promove a união dos membros da equipa, o que por sua vez é importante para a crença partilhada de que a equipa tem condições para continuar unida no futuro.

Como el liderazgo de complexidad y la cohesión influyen en la eficacia de los equipos.

Palabras-claves:
cohesión de grupo;
liderazgo;
desempeño.

Resumen

La presente investigación probó la hipótesis de que los comportamientos de facilitación están positivamente relacionados con las dimensiones objetiva y subjetiva de la eficacia de los equipos de trabajo. En este estudio participaron 40 equipos de 5 elementos (N = 200), donde se utilizó el juego de ordenador SimCity4. El análisis de los efectos directos e indirectos sugiere que el comportamiento de facilitación y la cohesión de tareas no están relacionados con el rendimiento, R2 = .08, MSE = 1.02, F(4, 35) = .79, p = .54; y que la cohesión de tarea media la relación entre comportamientos de facilitación y la viabilidad, R2 = .71, MSE = 0.31, F(4, 35) = 21.87, p < .001. Estos resultados sugieren que la práctica de comportamiento de facilitación promueve la unión de los miembros del equipo, así como la creencia compartida de que el equipo tiene condiciones para continuar unido en el futuro.

[1] Endereço para correspondência:
Universidade de Lisboa, CICPSI, Faculdade de Psicologia, Alameda da Universidade, Cidade Universitária, Lisboa, Portugal, 1649-004. Email: lcurral@fp.ul.pt

Como citar este artigo:
Leitão, P., Gomes, C., Marques-Quinteiro, P., Curral, L., & Lind, P. (2017). How complexity leadership and cohesion influence team effectiveness. *Revista Psicologia: Organizações e Trabalho*, *17*(4), 243-251. doi: 10.17652/rpot/2017.4.13712

The multitudes of interactions that occur in teams, alongside with the randomness that often characterizes organizational systems, prevent formal leaders from predicting and closely controlling the future and their teams' direction (Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009; Marion & Uhl-Bien, 2001; Nurmi, 1996). Instead, leadership emerges from interactions among team members and events happening in the system (e.g., the organization), which are dynamic and transcend the control abilities of any single individual (Goldstein & Hazy, 2006; Lichtenstein & Plowman, 2009; Lichtenstein et al., 2006).

A leadership theory that describes how leadership can promote team effectiveness in fast changing work environments is complexity leadership theory (Lichtenstein et al., 2006; Uhl-Bien & Marion, 2009). Complexity leadership theory (CLT) regards leadership as an emergent collective process of organizing, that results from the interactions between three leadership functions: administrative (i.e., the managerial and formal activities of an organization such as coordinating and planning tasks), adaptive (i.e., the informal and emergent actions that results from interactions between individuals regarding conflicts, ideas or preferences; and adaptive, creative and learning actions), and enabling (i.e., the communication ease actions that create the conditions for the emergence of adaptive structures; and manage and integrate the administrative-adaptive interface).

Complexity leadership theory argues that in order for groups and organizations to function properly, the administrative, adaptive, and enabling leadership functions need to be entangled (Uhl-Bien, Marion, & McKelvey, 2007). Entanglement is achieved through enabling leadership behaviors, which influence team effectiveness by answering the challenge of balancing exploration (i.e., the search of new possibilities, procedures and solutions) and exploitation (i.e., maximizing the efficiency of procedures and solutions already owned); and by providing the conditions by which innovative and emergent solutions, products and services, are incorporated in the formal organizational structure, providing the desired adaptability and effectiveness in complex environments (Uhl-Bien & Marion, 2009).

Complexity leadership theory proposes that the most effective leadership system is one that encourages open communication, and where there is a balance between administrative and adaptive leadership functions. If this condition is met, organizational systems and its constituents (e.g., teams) should be capable of experiencing higher connectedness amongst individuals (e.g., cohesion) and improved effectiveness (Lichtenstein et al., 2006). However, and to the best of our knowledge, little empirical work has explicitly and empirically examined CLT, and how it relates to task cohesion and effectiveness in the work place (Avolio, Walumbwa, & Weber, 2009). The current study tries to clarify such relationships by studying how enabling leadership behaviors relate to team effectiveness through task cohesion, in a laboratorial setting.

Theoretical Background

Differently from more leader centric and leader-follower centric approaches to leadership, CLT regards leadership as an emergent collective process where agents interact with each other in complex feedback networks (e.g., multi-team systems; Avolio et al., 2009). Under CLT, leadership can be performed by any team members whose actions enable and influence teamwork, and different leadership roles may be taken on by multiple individuals (Friedrich et al., 2009; Yammarino et al., 2015).

Complexity leadership theory assumes nonlinearity in most organizational systems, while simultaneously acknowledging that such systems operate in a context of traditional bureaucratic forms of organizing, where formal control structures exert influence upon organizational agents (i.e., individuals; teams), and outcomes (Uhl-Bien & Marion, 2009; Uhl-Bien et al., 2007). For this reason, CLT proposes that organizational functioning is sensitive to three main leadership functions: administrative leadership, adaptive leadership and enabling leadership. Such functions describe behaviors enacted across different groups and organizational levels, not being circumscribed to single individual leaders (Uhl-Bien & Marion, 2009).

Administrative leadership is related to the traditional perspective of leadership. It focuses on alignment and control, and is represented by the hierarchical/bureaucratic functions of the organization, that include official actions such as generating vision, developing the strategy for the organization, and structuring it (Livingston & Lusin, 2009; Uhl-Bien et al., 2007). It refers to formal top-down acts, based on authority and position that seek to plan and coordinate activities in order to achieve organizationally-prescribed outcomes in an efficient way (Uhl-Bien et al., 2007). Adaptive leadership is an informal collective dynamic that triggers emergent change activities and adaptability in the organization (Livingston & Lusin, 2009; Uhl-Bien & Marion, 2009; Uhl-Bien et al., 2007). It can be defined as a set of emergent change related behaviors that occur under conditions of interaction, interdependence, asymmetrical information, complex network dynamics, and tension (Uhl-Bien et al., 2007).

Finally, enabling leadership acts as the manager of the entanglement between administrative and adaptive leadership, by easing the communication between the other two functions. It does this through the creation of appropriate conditions to catalyze adaptive leadership, and by tailoring the behaviors of both administrative and adaptive leadership, resulting in a tandem functioning between the two (Uhl-Bien & Marion, 2009).

Enabling leadership therefore acts as a core function in deciding which creative outputs should pass from the organizational periphery to the broader bureaucratic structure, while limiting the passage of destructive ideas that could damage the organization (Livingston & Lusin, 2009; Uhl-Bien et al., 2007). In doing so, it creates a healthy, secure ambience for the adaptive function; it assures that the adaptive function serves the goals and mission of the organization; and it helps to incorporate adaptive outcomes into the formal structure (Uhl-Bien & Marion, 2009).

Consequently, the fundamental responsibility of the enabling leadership is the management of the bidirectional interface between the administrative and adaptive leadership functions (Livingston & Lusin, 2009). One possible way through which enabling leadership fulfills this role is by promoting task cohesion.

Complexity Leadership and Task Cohesion

Cohesion is the resultant of all forces acting on team members to remain in the group (Festinger, 1950). The multiple factors that induce groups to stick together and united resulted in a multidimensional view of this construct (Dion, 2000; Greer, 2012). In this particular study we will focus on the dimension of task cohesion, which refers to a shared commitment and attraction towards the completion of the group's task (Beal, Cohen, Burke, & McLendon, 2003), and which is key to effective teamwork (Beal et al., 2003; Chiocchio & Essiembre, 2009; Greer, 2012; Mullen & Copper, 1994; Zaccaro, Gualtieri, & Minionis, 1995). Research on task cohesion

suggests it develops when team members are strongly committed towards the achievement of a common goal (Festinger, 1950; Greer, 2012), and that once established it will positively influence team coordination and performance (e.g., LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Zaccaro et al., 1995).

Teamwork literature highlights the role of leadership in developing task cohesion (Kozlowski & Chao, 2012), as suggested in research on the relationship between cohesion and supportive leadership (Wendt, Euwema, & Van Emmerik, 2009), charismatic leadership (Wang, Chou, & Jiang, 2005), or transformational leadership (Bass, Jung, Avolio, & Berson, 2003). Whereas these forms of leadership are likely to build task cohesion by developing a sense of shared purpose and shared goal, complexity leadership could also contribute to the development of task cohesion if team members display enabling behaviors. The performance of enabling behaviors is positively related with the ease of the communication within the team, which promotes an alignment between members' behaviors and attitudes, and the goals of the team (Lichtenstein et al., 2006). Complexity leadership enabling behaviors facilitate communication flow by smoothing noise that results from conflict and communication breakdowns, and thus allows for the integration of divergent views into a single objective. This helps team members to improve their shared commitment to team's goals. Given this we hypothesize that:

Hypothesis 1: Enabling leadership will be positively related to task cohesion.

Cohesion and Team Effectiveness

Task cohesion is fundamental for team effectiveness (e.g., Beal et al., 2003; Mathieu, Kukenberger, D'Innocenzo, & Reilly, 2015; Maynard, Kennedy, Sommer, & Passos 2015; Salas, Grossman, Hughes, & Coultas, 2015). According to Hackman (1987), team effectiveness can be decomposed in quantity related, and quality related teamwork outcomes: performance and viability. Effective teams require the ability to produce acceptable outputs in association with the ability to work together in the future. As such, the present study will consider team performance and team viability as two dimensions of team effectiveness.

Team performance is frequently operationalized as productivity, sales performance or goal achievement (Guzzo & Dickson, 1996). Teamwork literature suggests that performance improvements are more likely to happen when teams have high task cohesion (Carless & De Paola, 2000), especially because task cohesion promotes team responsiveness and decision-making under temporal stress (Zaccaro, 1991; Zaccaro et al., 1995). Furthermore, several meta-analyses such as Beal et al. (2003) have found evidence of a positive link between task cohesion and performance in the workplace. According to Mullen and Copper (1994), one distinguishing feature of high performance groups is not the smooth coordination of their member's interaction, the liking for each other, or the proudness of their group, but the commitment to successfully perform the task, and the regulation of their behavior towards that end (i.e., task cohesion). Following this we hypothesize that:

Hypothesis 2: Task cohesion is positively related with team performance.

Team viability also constitutes an important attribute of team effectiveness (Bell & Marentette, 2011). Viability is the extent to which individuals wish to remain members of the team, based on their perception of the team's capability to perform effectively in the future (Hackman, 1987). Research suggests that cohesion and viability are positively related constructs (Jehn, Greer, Levine, & Szulanski 2008; Tekleab, Quigley, & Tesluk, 2009). This stems from the fact that cohesive members, by being attracted to the team's task, will work to keep the group intact (Jehn et al., 2008; Maynard et al., 2015). Task cohesion may be positively related to team viability because attraction towards the team's task results in a continuum effort towards that task. Task cohesion should enhance the perception of the team's capability to perform effectively in the future, and thus improving team viability (Bell & Marentette, 2011). Based on these arguments, we hypothesize that:

Hypothesis 3: Task cohesion is positively related with team viability.

Complexity leadership theory, cohesion and team effectiveness

Having determined the relationship between the enabling function and task cohesion, and task cohesion and team effectiveness, the last relationship of interest in the present study is the one between the enabling function behaviors and team effectiveness. The enabling leadership function controls the passage of destructive ideas that could damage the team, while allowing the introduction of adaptive outcomes that could result in higher team effectiveness (Livingston & Lusin, 2009). Specifically, enabling leadership could improve the team's ability to perform better by providing the means for incorporating adaptive and innovative solutions useful for the task at hands, and by increasing the capacity and desire of teams to remain as a unit by preventing its implosion (Uhl-Bien & Marion, 2009). Grounded on these arguments, we hypothesize that:

Hypothesis 4a: Enabling behaviors will be positively related to performance.

Hypothesis 4b: Enabling behaviors will be positively related to viability.

However, this is not the only way through which CLT's enabling function could affect team effectiveness. Similar to what has been proposed in other studies (e.g., Michalisin, Karau, & Tangpong, 2007) it is possible that instead of a direct relationship with team effectiveness, enabling leadership will relate to effectiveness through other dimensions of teamwork, such as task cohesion. If we take into consideration the possible relationship between enabling function and cohesion, and the relationship between task cohesion and team effectiveness, both previously stated and explored, it is plausible that enabling behaviors could indirectly improve team effectiveness. Enabling leadership behaviors could build a strong sense of purpose that helps the team remain together during difficult situations, when coordination fails and team stability is challenged. This can happen because enabling behaviors facilitate communication flow and remove barriers to collaboration between team members, which will help them in the pursuit of a common goal. All of this should contribute to team performance, and to the development of a shared belief that the team has what it takes to keep working together on future assignments. Therefore, we hypothesize that:

Hypothesis 5a: Enabling behaviors will be positively related to performance, through task cohesion.

Hypothesis 5b: Enabling behaviors will be positively related to viability, through task cohesion.

Figure 1 summarizes the research model. In the following sections we describe how we have addressed the research hypotheses.

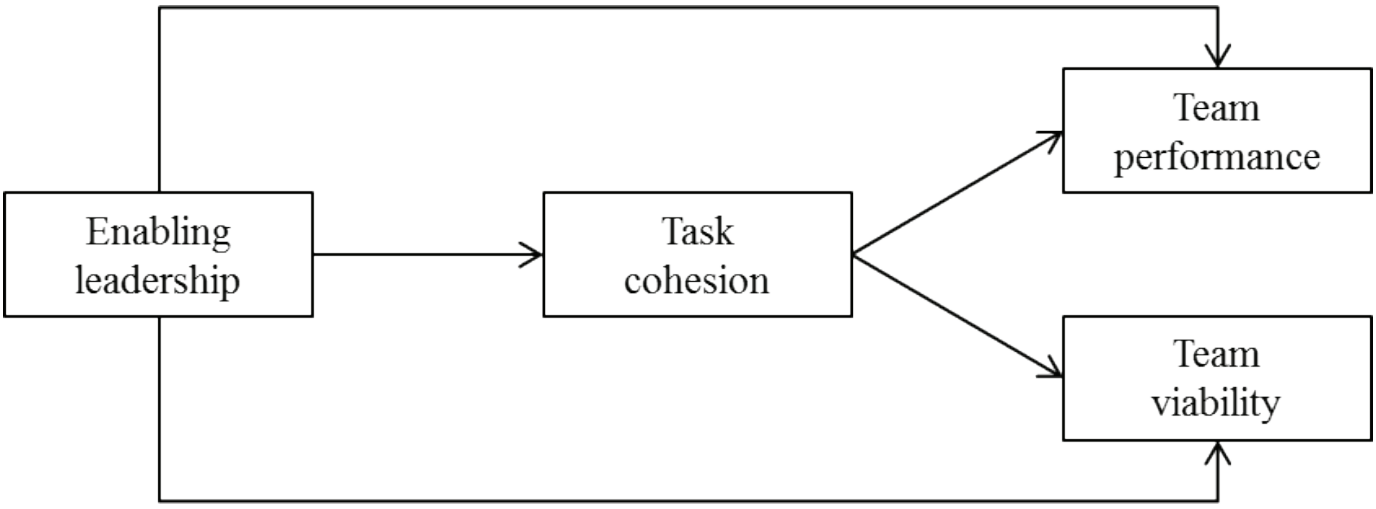

Figure 1. The research model.

Method

Participants

Two hundred participants were divided in 40 teams of five individuals each. Team size was equal for all teams in order to control for its' potentially biasing effect on the mediator and outcome variables (e.g., Curral, Forrester, Dawson, & West, 2001). Team size was fixed at five individuals per team to allow the proportions of CLT functions to emerge according to what is stipulated in CLT theory (Uhl-Bien & Marion, 2009).

Students were asked to bring four persons and make a team to participate in the simulation experiment. No criteria for inclusion or exclusion of the participants were set. Psychology students received course credits as a compensation for enrolling in the experiment, while the participants that came with them to enter into the experiment received a 10 euro voucher. The sample was composed of n_{men} = 71 and n_{female} = 129, presenting an average age of 23.06 years (*SD* = 4.09). Seventy three percent (*n* = 146) of the participants were full-time students, 16% (*n* = 32) full-time workers, and the remaining 11% (*n* = 22) incorporated both roles. Most participants (60%) reported having no experience with the SimCity game, with a total of 164 participants (82%) having played 10 hours or less. Three participants (1.5%) reported the highest level of expertise having played over 100 hours with this or other versions of the game. Twelve percent of the participants reported having no familiarity with their team members, representing not having previous knowledge or bonds with the other team members. On the other hand, 3% of the participants reported knowing all other team members very well, stating deep knowledge or bonds with all 4 other members. Half of the participants reported familiarity ratings below 50%, and the other half reported familiarity ratings above 50%.

Task Description

Teams performed a simulation task on the pc-game SimCity4 Deluxe Edition (EA Games, 2004), a simulated city-building game, used in past research of work teams (e.g., Randall, Resick, & DeChurch, 2011; Resick et al., 2010), in which users build, design and govern a metropolitan city, where all changes ultimately affect the funds and desirability of the city. The fourth version of the game was specifically chosen since it included the introduction of Sims in the population which interact and respond in an autonomous way to the choices and actions of the mayor, producing different interdependent phenomena, that can be understood as a limited, game-coded, emerging complexity (Devisch, 2008), thus constituting an ideal setting for the present study.

Teams were placed as the governors of a set of four pre-existing cities (i.e., Konradshohe Knut, Tagel Madeline, Spandau Hans, and Kensington Beto), being responsible for making and implementing decisions regarding all aspects of the different cities. Although teams were free to collectively make any choice and in-game action they saw fit, only one participant was allowed to use the keyboard and mouse in order to truly implement the decisions made by the team. The types of changes enabled to the participants included, but were not limited to, setting tax rates, constructing buildings, power grids, and other structures, providing a public transportation network, rezoning areas and legalizing gambling. Teams had the goal of increasing population growth by improving the different cities attractiveness, while also managing and improving the cities funds. Even though SimCity allowed for three different game modes (i.e., God, Mayor, and MySim) and speeds (i.e., Turtle, Rhino, and Cheetah), participants were instructed to always remain in "Mayor mode", and also to always remain on the Rhino Speed. This decision was grounded on a pre-test that was carried out with an initial five member team - (not included in the total of participants that were accounted for this study) - assembled to test the entire procedure and decide on the mode, speed and final task duration that was most adequate, and that would allow for the participants to be able to achieve the goals set to them, considering the time restriction imposed.

Procedure

Upon arrival participants were greeted and directed to a central table where they filled in the informed consent, and grabbed a letter identification tag. Then they were directed to individual computers where they completed a series of demographic measures. In order to give participants the basic skills to answer successfully to the simulation task, they were given 30 minutes to play a series of four tutorials in the individual computers (i.e., "Get Started", "Making money", "Big City", and "Rush Hour"). After that, the participants returned to the center table, and started working on the group task.

Before the beginning of each simulation, the experimenter advised the participants that they should work as a team, and that they should share knowledge in the decision-making process in order to maximize population growth and available money. The game was displayed using a projector directed to a white wall, and the chairs rounding the table were displayed in a manner that allowed all participants to see the game. No formal leadership role was established or imposed in each group. In order to prevent the person with more experience to be nominated by the group as a formal leader, assuming the charge of the mouse and the control for the execution of all decisions, the participants were randomly assigned the control of the mouse and keypad. Each task took 12 minutes, and time was displayed in a PC screen using Online StopWatch (http://www.online-stopwatch.com/http://www.online-stopwatch.com/full-screen-stopwatch/). At Rhino Speed, 12 minutes correspond to two years of city development in SimCity.

Once the laboratorial task was completed, participants were asked to proceed to their individual computers and complete a set of questions that measured task cohesion, viability, and complexity enabling leadership.

Measures

*Enabling Leadership***.** Enabling behaviors were measured using a 6-item scale developed by Gomes, Mendes, Marques-Quinteiro, Lind, and Curral (2015) as specified by the CLT framework. Because CLT specifies that enabling behaviors can be performed by any individual in the team, enabling leadership was measured by asking participants to rate every other team member (e.g., "Facilitated the integration of innovative results in the formal system of the team"). This rendered 25 enabling leadership ratings per team. A composition aggregated measure was estimated by computing the average value for enabling leadership in each team. Responses were given on a six point Likert type scale that ranged from "*Never*" to "*Always*" (α = .89).

Task cohesion. Task cohesion was measured with four items (e.g., "Our team is united in trying to reach its goals for performance") from the team environment questionnaire (Carless & De Paola, 2000), and adapted by Marques-Quinteiro, Passos, Curral, and Rico (2013). Respondents gave their answers using a six point Likert type scale that varied from "Completely disagree" to "Completely agree" (α = .66).

Team viability. Team viability was measured using four items (e.g., "This team can perform well in future projects") from the Team Viability Scale (Standifer, Halbesleben, & Kramer, 2009), adapted by Costa, Passos and Barata (2015). Responses were given on a six point Likert type scale that ranged from "Completely disagree" to "Completely agree" (α = .90).

Team performance. Team performance was measured using objective game indicators: final profit; obtained by the subtraction of the initial sum of money, to the final sum obtained in the end of the task.

Control variables - Game Expertise. One question regarding game experience was included in order to assess the expertise of the participants with the current game (i.e., "How many hours of experience do you have with the SimCity4 game, or other versions of this game"?). This question was considered given that previous game experience has been shown to influence performance (Orvis, Horn, & Belanich 2008), and could then account for a possible effect on teams' results. Participants were provided with a scale ranging from 0% (no experience) to 100% (total experience).

Control variables - Familiarity. One question related to the familiarity between team members was included (i.e., "Please tell us the degree of familiarity that exists between the members of this team?"). This question was taken into account because familiarity tends to facilitate interpersonal attraction, creating a greater bond between the team members, and also, because familiar teams tend to outperform less familiar ones (Harrison, Mohammed, McGrath, Florey, & Vanderstoep, 2003). The scale used to measure the degree of familiarity ranged from 0% (none) to 100% (full). Again, we suggest that this variable provides a useful operationalization of the team member familiarity construct in the current study.

Variable Aggregation

In order to respond to the level of analysis used in the present study, individual responses were aggregated at the team-level. To statistically justify the aggregation of variables, values concerning the interrater agreement, reliability and consistency were obtained using $Rwg_{(j)}$ (James, DeMaree, & Wolf, 1984) and ICC(1) and ICC(2) (Bliese, 2000) respectively. The mean values for the $Rwg_{(j)}$ obtained were, respectively, of .86, .92, and .84 for the CLT enabling, cohesion and viability variables in study. All of these values surpass the minimum recommended value of .83 for a combination of 6 categories and 5 raters (Dunlap, Burke, & Smith-Crow, 2003), such as the one present in this study and as such it is adequate to aggregate the data at the team-level.

Since it is possible that variables have high agreement between raters without having high reliability, the intraclass correlation coefficients (ICC's) were also calculated in the present study the ICC's(1) found were, respectively, of .17, .15, and .35 for the CLT, cohesion and viability variables. In the present study ICC's(2) found were, .50, .48, and .73 for the CLT, cohesion and viability variables, respectively.

Table 1
Intercorrelations and descriptive statistics

	1	2	3	4	5	*M*	*SD*
Team member familiarity	-					45.25	21.23
Team member gaming experience	.19	-				9.06	8.49
Enabling leadership	.52**	-.09	-			3.24	.45
Task cohesion	.30	-.04	.61**	-		4.12	.34
Team performance	-.01	-.08	-.13	.09	-	-.511.51	762.53
Team viability	.49**	.07	.64**	.79**	.23	4.03	.67

Note. ** $p < .01$; * $p < .05$.

Similarly to the values of the $Rwg_{(j)}$, the values for both ICC's were within an acceptable range of values (i.e., ICC1 ≥ .05, .20 ≤; ICC2 ≥ .70; Bliese, 2000), and as such the variables were aggregated at the team level. The small sample size can help explaining the fact that the ICC2 scores for CLT and cohesion were below .70.

Results

Results in Table 1 show that team viability had a positive correlation with enabling behaviors, $r = .636$, $p < .001$, and team cohesion, $r = .794$, $p < .001$. There was also a positive relationship between enabling behaviors and team cohesion, $r = .609$, $p < .001$. No correlation was found for team objective performance.

Regarding the control variables, a significant relationship was found between familiarity and enabling behaviors, $r = .519$, $p = .001$, and between familiarity and team viability, $r = .493$, $p = .001$. No correlations were found between game experience and the other remaining variables.

Table 2
Results of the mediation model for team performance

					95% CI	
Steps	β	*SE*	*t*	*p*	LB	LL
Direct and total effects R^2= .08, *MSE* = 1.02, *F*(4, 35) = .79, *p* = .54						
Team performance regressed on enabling leadership	-.20	.20	-1.03	.31	-.60	.20
Task cohesion regressed on enabling leadership	.62	.16	3.94	.0004	.30	.95
Team performance regressed on task cohesion, controlling for enabling leadership	.28	.20	1.36	.18	-.14	.69
Team performance regressed on enabling leadership, controlling for task cohesion	-.38	.23	-1.61	.12	-.27	.53
Partial effects of control variables on team performance						
Team member familiarity.	.13	.20	.66	.52	-.27	.53
Team member gaming experience.	-.12	.17	-.71	.48	-.46	.24
Bootstrap results for indirect effect						
Effect	.17	.12	-	-	-.01	.48

Note. Bootstrap resampling = 5,000.

Regarding hypotheses testing, the results suggest that enabling behaviors positively relate with team cohesion, β =. 62, *SE* = .16, *t* = 3.94, *p* < .001, 95% CI [.30, .95].

Table 3
Results of the mediation model for team viability

					95% CI	
Steps	β	*SE*	*t*	*p*	LB	LL
Direct and total effects R^2= .71, *MSE* = 0.32, *F*(4, 35) = 21.87, *p* < .001						
Team viability regressed on enabling leadership.	.54	.15	3.63	.001	.24	.84
Task cohesion regressed on enabling leadership.	.62	.16	3.94	< .001	.30	.95
Team viability regressed on task cohesion, controlling for enabling leadership.	.65	.11	5.73	< .001	.42	.88
Team viability regressed on enabling leadership, controlling for task cohesion.	.13	.14	1.02	.32	-.13	.40
Partial effects of control variables on team viability						
Team member familiarity.	.22	.11	1.96	.06	-.01	.44
Team member gaming experience.	.07	.09	.76	.45	-.12	.26
Bootstrap results for indirect effect						
Effect	.41	.13	-	-	.21	.71

Note. Bootstrap resampling = 5,000.

Hypothesis 1 was supported (Table 2). Different from what was expected, no direct relationship was found between enabling leadership behaviors and team performance, β = -.20, *SE* = .19, *t* = -1.02, *p* = .31, 95% CI [-.60, .20]; and no direct relationship was found between team cohesion and team performance, β = .28, *SE* = .20, *t* = 1.35, *p* = .18, 95% CI [-.14, .69]. Hypotheses 2, 4a and 5a were rejected.

The results in Table 3 suggest that enabling leadership positively related with team viability, β = .54, *SE* = .15, *t* = 3.63, *p* < .001, 95% CI [.24, .84], and task cohesion positively related with team viability, β = .65, *SE* = .12, *t* = 5.73, *p* < .001, 95% CI [.42, .88]. Hypotheses 3 and 4b were supported.

The indirect effect of enabling leadership on team viability through team cohesion was positive and significant, β = .40, Boot *SE* = .13, 95% CI [.21, .74]. Additionally, after the inclusion of team cohesion as a mediator in the model the relationship between enabling leadership and team viability became not significant, β = .13, *SE* = .13, *t* = 1.02, *p* = .31, 95% CI [-.13, .40]. Team cohesion fully mediated the relationship between enabling leadership and team viability.

Discussion

The present study tested a model connecting CLT enabling function with team effectiveness, through the mediating role of task cohesion. Our results suggest that CLT's enabling behaviors create the conditions for the emergence of task cohesion, probably because they contribute to an increment in team members' agreement that their task is meaningful, and to team members shared commitment towards the accomplishment of shared goals. To the best of our knowledge, this finding constitutes one of the first empirical links being established between the CLT framework and team's emergent states such as task cohesion.

The results suggest that enabling leadership positively relates with team viability, through team task cohesion. The results also suggest that enabling leadership is positively related with team viability. This could be explained by the effect that enabling leadership behaviors have in limiting the emergence of destructive or dysfunctional ideas among team members (Livingston & Lusin, 2009; Uhl-Bien et al., 2007), resulting in an improvement of group integrity (Hackman, 1987). Furthermore, improving ease of communication and efficiently managing conflict seems important to improved team members' perceptions of team long term sustainability. The results also suggest that teams that are more task cohesive have improved perceptions of the team's capability to perform effectively in the future (Bell & Marentette, 2011), resulting in a stronger desire to remain a part of the team. This result is particularly relevant, since previous studies (e.g., Jehn et al., 2008; Tekleab et al., 2009) did not specifically addressed the relationship between task cohesion and team viability.

Based on previous research, it would be expected that the beneficial effect of CLT enabling behaviors on team communication capacity would also have a positive relationship with team performance (e.g., Smith et al., 1994). Similarly, we would have expected a positive and significant relationship between task cohesion and team performance (e.g., Beal et al., 2003). In our research, as others before (e.g., Zaccaro et al., 1995) we have established minimum group conditions for the emergence of team task cohesion by setting a collective goal. Laboratorial research examining the relationship between team cohesion, team communication processes (e.g., coordination), and team performance in newly assembled teams spans from experimental procedures in which experimental tasks last for ten weeks (e.g., Mathieu et al., 2015), to experimental procedures in which experimental tasks only take 10 minutes to be completed (e.g., Zaccaro et al., 1995). To the best of our knowledge, whereas there are no guidelines for the minimum amount of time needed for team communication and team task cohesion to develop and establish in laboratorial groups, one possible explanation could be that the time given to teams to work together was insufficient to capture the micro-level dynamics of the cohesion-performance relationship (Beal et al., 2003; Mathieu et al., 2015; Maynard et al., 2015).

Building on the environmental constraints that affect outcome performance indicators, another explanation could derive from the initial conditions of the four cities. Despite each city portraying the same difficulty level (when considering the existing structures and the different problems facing the city), they do portrait different initial budgets and available starting money. These environmental constraints could impact the final profit obtained by the teams and thus affect their performance.

Finally, the results of the current research could be explained by the possibility that participating teams exceeded the optimal amount of cohesion that results in maximum team performance, with amounts below or above this optimal point leading to decreased team performance. Recent works have proposed such inversely curvilinear relationship between group cohesion and team performance (e.g., Wise, 2014). In this perspective, too much cohesion could result in decreased team performance since it would lead to increased groupthink (Langfred, 2004), undermining the friction required for the actions of the Adaptive Leadership function in producing innovative and helpful solutions.

Theoretical and practical implications

The present findings contribute to the growing body of literature on CLT, and help clarify its effect on team effectiveness through task cohesion. This study represents a first empirical approach to the study of CLT enabling function and its effect on team emergent states and consequently team effectiveness. Complex leadership theory may reveal itself as a more accurate explanation of the adaptation process in an unpredictable and complex world.

Thus, any empirical support to its tenets is an opportunity to refine the theory itself. On a practical stand point, organizations should adopt specific training directed at the promotion of enabling behaviors (e.g., facilitating communication, aligning attitudes with the goals manifested) thus allowing the facilitation of a more positive and effective entanglement between the remaining functions, resulting in the gains described previously. If these training sessions were designed and directed towards top leaders, their influence on organizational culture (e.g., by conditioning the responses of the group in an attempt to facilitate adaptation and integration) could allow for the dissemination of these emergent behaviors throughout the entire organization, creating the interactional basis (enabling function - entanglement) necessary for a greater organizational wide commitment (task cohesion) towards the defined objective, and also allowing for a greater staff retention due to their desire to remain a part of this specific organization (team viability).

Limitations and future directions

A limitation of this research is its cross-sectional design. The cross-sectional design and common method approach utilized in this study might raise concern regarding potential biasing (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Nevertheless, the direction of relationships tested in our model is consistent with previous literature. In order to further clarify the causal nature of the relationships examined in this study, future studies should adopt a longitudinal or experimental approach (Podsakoff et al., 2003).

Another limitation in this research is that although participants were instructed to improve both population growth and money revenue, there was no control had no way to what of the extent to which participants decided to focus more on one particular goal. For example, if participants decided to focus on population growth alone, regardless of the monetary cost of the actions they carried, this would mean an increase in expenses and a drop in overall performance. Future extensions of this research could either control for the type of goal in which participants agree to focus on, or even assign different goals to the teams (e.g., improve population growth vs. improve money revenue) and see how these impact their teamwork.

Focusing now on the possibilities for future studies, an interesting addition to this literature would be the inclusion of a social network analysis (SNA). The use of SNA software allows researchers to portray a team network in a way that shows the overall structural cohesiveness of a team, but also the individual's position, role and centrality in the network (Warner, Bowers, & Dixon, 2012). In simple terms, SNA makes visible the patterns of information sharing (i.e., communication) within and across networks and would allow us to identify issues that could currently be hindering a group and the specific behaviors and organizational elements that could be modified to improve overall group efficiency and effectiveness (Cross, Borgatti, & Parker, 2004). For example, SNA would allow us to identify structural holes (i.e., disconnections between nodes), that could, possibly, be related to specific functions (e.g., an administrative behavioral leader who is stifling the remaining functions of the team) and that could result in a decrease in task cohesion, team effectiveness and, team viability.

If we take into consideration the existence of different leadership strategies in a single network, the use of SNA and its network diagrams would allow us to determine the centrality (i.e., the number of connections and communication paths established by each individual member and its relative importance within the network) of the different strategies, identifying the most influential leader or leaders in the emergence of team cohesion.

In sum, using SNA would allow us to maintain a team view over the main concepts in study, while, simultaneously, allowing us to drill down to the individual level so that we may better understand how the different behaviors of each single individual are affecting the team level cohesiveness, performance and viability of the group, and possibly identify sets of behaviors connections (e.g., Adaptive + Enabling) that provide higher contributions to these emergent states.

General conclusion

Leadership frameworks designed to provide a better solution and adaptation to complex and uncertain environments are still seldom explored in practical terms. Complexity leadership theory fits into such a reality, a framework that allows for a better adaptation to complex environments, but lacks empirical testing to its propositions and effects. This study presents empirical evidence suggesting that complexity leadership builds team's commitment towards its task, and assures team survival by improving their integrity as a unit. And in an uncertain world, what better goal could there be for an organization than to assure its survival for the future.

References

Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. *Annual Review of Psychology, 60*, 421-49. doi: 10.1146/annurev.psych.60.110707.163621

Bass, B. M., Jung, D. I., Avolio, B. J., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology, 88*(2), 207-218. doi: 10.1037/0021-9010.88.2.207

Beal, D. J., Cohen, R. R., Burke, M. J., & McLendon, C. L. (2003). Cohesion and performance in groups : A meta-analytic clarification of construct relations. *Journal of Applied Psychology, 88*(6), 989-1004. doi: 10.1037/0021-9010.88.6.989

Bell, S. T., & Marentette, B. J. (2011). Team viability for long-term and ongoing organizational teams. *Organizational Psychology Review, 1*(4), 275-292. doi: 10.1177/2041386611405876

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, Extensions, and new directions* (pp. 349-381). San Francisco: Jossey-Bass.

Carless, S. A., & De Paola, C. (2000). The measurement of cohesion in work teams. *Small Group Research, 31*(1), 71-88. doi: 10.1177/104649640003100104

Chiocchio, F., & Essiembre, H. (2009). Cohesion and performance: A meta-analytic review of disparities between project teams, production teams, and service teams. *Small Group Research*, *40*(4), 382-420. doi: 10.1177/1046496409335103

Costa, P. L., Passos, A. M., & Barata, M. C. (2015). Multilevel influences of team viability perceptions. *Team Performance Management*, *21*(1/2), 19-36. doi: https://doi.org/10.1108/TPM-03-2014-0020

Cross, R., Borgatti, S. P., & Parker, A. (2002). Making invisible work visible: Using social network analysis to support strategic collaboration. *California Management Review*, *44*(2), 25-46.

Curral, L. A., Forrester, R. H., Dawson, J. F., & West, M. A. (2001). It's what you do and the way that you do it: Team task, team size, and innovation-related group processes. *European Journal of Work and Organizational Psychology*, *10*(2), 187-204. doi: http://dx.doi.org/10.1080/13594320143000627

Devisch, O. (2008). Should planners start playing computer games? Arguments from SimCity and second life. *Planning Theory & Practice*, *9*(2), 209-226. doi: 10.1080/14649350802042231

Dion, K. L. (2000). Group cohesion: From "field of forces" to multidimensional construct. *Group Dynamics*, *4*(1), 7-26. doi: 10.1037//1089-2699.4.1.7

Dunlap, W. P., Burke, M. J., & Smith-Crowe, K. (2003). Accurate tests of statistical significance for Rwg and average deviation interrater agreement indexes. *Journal of Applied Psychology*, *88*(2), 356-262. doi: 10.1037/0021-9010.88.2.356

EA Games. (2004). *SimCity 4 deluxe edition* [Computer software]. Redwood City: Electronic Arts.

Festinger, L. (1950). Informal social communication. *Psychological Review*, *57*(5), 271-282. doi: 10.1037/h0056932

Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *Leadership Quarterly*, *20*(6), 933-958. doi: https://doi.org/10.1016/j.leaqua.2009.09.008

Goldstein, J. A., & Hazy, J. K. (2006). Editorial introduction to the special issue: From complexity to leadership and back to complexity. *Emergence: Complexity & Organization*, *8*(4), 5-7.

Gomes, C., Mendes, M., Marques-Quinteiro, P., Lind, P., & Curral, L. (2015, May). *Measuring complexity leadership.* Communication presented at the 17th Congress of the European Association of Work and Organizational Psychology, Oslo, Norway.

Greer, L. L. (2012). Group cohesion: Then and now. *Small Group Research*, *43*(6), 655-661. doi: 10.1177/1046496412461532

Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual Review of Psychology*, *47*(1), 307-338. doi: 10.1146/annurev.psych.47.1.307

Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315-342). New York: Prentice Hall.

Harrison, D. A., Mohammed, S., McGrath, J. E., Florey, A. T., & Vanderstoep, S. W. (2003). Time matters in team performance: Effects of member familiarity, entrainment, and task discontinuity on speed and quality. *Personnel Psychology*, *56*(3), 633-669. doi: 10.1111/j.1744-6570.2003.tb00753.x

James, L. R., Demaree, R. J., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69*(1), 85-98. doi: 10.1037/0021-9010.69.1.85

Jehn, K. A., Greer, L., Levine, S., & Szulanski, G. (2008). The effects of conflict types, dimensions, and emergent states on group outcomes. *Group Decision and Negotiation*, *17*(6), 465-495. doi: 10.1007/s10726-008-9107-0

Kozlowski, S. W. J., & Chao, G. T. (2012). The dynamics of emergence: Cognition and cohesion in work teams. *Managerial & Decision Economics*, *33*(5-6), 335-354. doi: 10.1002/mde.2552

Langfred, C. W. (2004). Too much of a good thing? Negative effects of high trust and

individual autonomy in self-managing teams. *Academy of Management Journal*, *47*(3), 385-399. doi: http://psycnet.apa.org/doi/10.2307/20159588

LePine, J. A., Piccolo, R. F., Jackson, C. L., Mathieu, J. E., & Saul, J. R. (2008). A meta-analysis of teamwork processes: Tests of a multidimensional model and relationships with team effectiveness criteria. *Personnel Psychology*, *61*(2), 273-307. doi: 10.1111/j.1744-6570.2008.00114.x

Lichtenstein, B. B., & Plowman, D. (2009). The leadership of emergence: A complex systems leadership theory of emergence at successive organizational levels. *Leadership Quarterly*, *20*(4), 617-630. doi: 10.1016/j.leaqua.2009.04.006

Lichtenstein, B. B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J., & Schreiber, C. (2006). Complexity leadership theory: An interactive perspective on leading in complex adaptive systems. *Emergence: Complexity & Organization*, *8*(4), 2-12.

Livingston, D., & Lusin, J. (2009). A prescriptive hybrid model of leadership: Complexity leadership theory and authentic leadership theory. In J. Politis (Ed.), *Proceedings of the 5th European Conference On Management, Leadership & Governance* (pp. 102-109). Reading: Academic Publishing.

Marion, R., & Uhl-Bien, M. (2001). Leadership in complex organizations. *Leadership Quarterly*, *12*(4) 389-418. doi: 10.1016/S1048- 9843(01)00092-3

Marques-Quinteiro, P., Passos, A. M., Curral, L., & Rico, R. (2013, May). *Task coordination and adaptive behavior in work groups: A preliminary look at team cohesion.* Communication presented at the 16th European Association of Work and Organizational Psychology Conference, Münster, Germany.

Mathieu, J. E., Kukenberger, M. R., D'Innocenzo, L., & Reilly, G. (2015). Modeling reciprocal team cohesion–performance relationships, as impacted by shared leadership and members' competence. *Journal of Applied Psychology*, *100*(3), 713-734. doi: 10.1037/a0038898

Maynard, M. T., Kennedy, D. M., Sommer, S. A., & Passos, A. M. (2015). Team cohesion: A theoretical consideration of its reciprocal relationships within the team adaptation nomological network. In E. Salas, W. B. Vessey & A. X. Estrada (Eds.), *Team cohesion: Advances in psychological theory, methods and practice (research on managing groups and teams* (Vol. 17, pp. 83-111). United States of America: Emerald Group Publishing Limited.

Michalisin, M. D., Karau, S. J., & Tangpong, C. (2007). Leadership's activation of team cohesion as a strategic asset: An empirical simulation. *Journal of Business Strategies*, *24*(1), 1-26.

Mullen, B., & Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin*, *115*(2), 210-227. doi: http://dx.doi.org/10.1037/0033-2909.115.2.210

Nurmi, R. (1996). Teamwork and team leadership. *Team Performance Management: An International Journal*, *2*(1), 9-13. doi: https://doi.org/10.1108/13527599610105484

Orvis, K. A., Horn, D. B., & Belanich, J. (2008). The roles of task difficulty and prior videogame experience on performance and motivation in instructional videogames. *Computers in Human Behavior*, *24*(5), 2415-2433. doi: https://doi.org/10.1016/j.chb.2008.02.016

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879-903. doi: 10.1037/0021-9010.88.5.879

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behaviour Research Methods*, *40*(3), 879-891. doi: 10.3758/BRM.40.3.879.

Randall, K. R., Resick, C. J., & DeChurch, L. A. (2011). Building team adaptive capacity: The roles of sensegiving and team composition. *The Journal of Applied Psychology*, *96*(3), 525-40. doi: 10.1037/a0022622

Resick, C. J., Murase, T., Bedwell, W. L., Sanz, E., Jiménez, M., & DeChurch, L. A. (2010). Mental model metrics and team adaptability: A multi-facet multi-method examination. *Group Dynamics: Theory, Research, and Practice*, *14*(4), 332-349. doi: 10.1037/a0018822

Salas, E., Grossman, R., Hughes, A. M., & Coultas, C. W. (2015). Measuring team cohesion: Observations from the science. *Human Factors*, *57*(3), 365-74. doi: 10.1177/0018720815578267

Smith, K. G., Smith, K. A., Olian, J. D., Sims Jr, H. P., O'Bannon, D. P., & Scully, J. A. (1994). Top management team demography and process: The role of social integration and communication, *Administrative Science Quarterly*, *39* (3), 412-438.

Standifer, R. L., Halbesleben, J., & Kramer, J. (2009, April). *The impact of individual temporal differences on team process and team effectiveness.* Paper presented at the 24th annual conference of the Society for Industrial & Organizational Psychology (SIOP), New Orleans, Louisiana.

Tekleab, A. G., Quigley, N. R., & Tesluk, P. E. (2009). A longitudinal study of team conflict, conflict management, cohesion, and team effectiveness. *Group & Organization Management*, *34*(2), 170-205. doi: 10.1177/1059601108331218

Uhl-Bien, M., & Marion, R. (2009). Complexity leadership in bureaucratic forms of organizing: A meso model. *Leadership Quarterly, 20*(4), 631-650. doi:10.1016/j.leaqua.2009.04.007. doi: 10.1016/j.leaqua.2009.04.007

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *Leadership Quarterly*, *18*(4), 298-318.

Wang, E., Chou, H., & Jiang, J. (2005). The impacts of charismatic leadership style on team cohesiveness and overall performance during ERP implementation. *International Journal of Project Management*, *23*(3), 173-180. doi: 10.101 6/j.ijproman.2004.09.003

Warner, S., Bowers, M. T., & Dixon, M. A. (2012). Team dynamics: A social network perspective. *Journal of Sport Management*, *26*(1), 53-66.

Wendt, H., Euwema, M. C., & Van Emmerik, I. (2009). Leadership and team cohesiveness across cultures. *Leadership Quarterly*, *20*(3), 358-370. doi: 10.1016/j.leaqua.2009.03.005.

Wise, S. (2014). Can a team have too much cohesion? The dark side to network density. *European Management Journal*, *32*(5), 703-711. doi: 10.1016/j.emj.2013.12.005

Yammarino, F. J., Mumford, M. D., Connelly, M. S., Day, E. A., Gibson, C., McIntosh, T., & Mulhearn, T. (2015). Leadership models for team dynamics and cohesion: The Mars mission. In E. Salas, W. B. Vessey & A. X. Estrada (Eds.), *Team cohesion: Advances in psychological theory, methods and practice (research on managing groups and teams* (Vol. 17, pp. 83-111). United States of America: Emerald Group Publishing Limited.

Zaccaro, S. J. (1991). Nonequivalent associations between forms of cohesiveness and group-related outcomes: Evidence for multidimensionality. *Journal of Social Psychology*, *131*(3), 387-399. doi: 10.1080/00224545.1991.9713865

Zaccaro, S. J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology*, *7*(2), 77-93. doi: 10.1207/s15327876mp0702_3

Informações sobre o artigo
Recebido em: 20/04/2017
Primeira decisão editorial: 05/07/2017
Versão final em: 24/07/2017
Aceito em: 22/09/2017