UNIVERSIDADE DE LISBOA
FACULDADE DE PSICOLOGIA

COHESION IN MULTITEAM SYSTEMS: EFFECTS OF TYPE OF TRAINING AND ADAPTATION TRIGGERS ON LEVELS OF SOCIAL AND TASK COHESION – AN EXPERIMENTAL STUDY.

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Dissertação Orientada pelo Professor Doutor Luís Alberto Curral

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I read that "*if at first you don't succeed*.....

…….*don't skydive*".

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Resumo

Verificou-se, na última década, uma expansão significativa da literatura sobre sistemas multi-equipa, apontando-se a necessidade de melhor compreender a variável coesão nestes sistemas. Os sistemas multi-equipa operam frequentemente em ambientes extremos e imprevisíveis, que requerem treino especializado e elevados níveis de coesão. O efeito do treino sobre a coesão, ao nível dos multi-sistemas, é uma área de investigação que tem recebido pouca atenção. A presente investigação pretende colmatar esta lacuna ao investigar a variação nos níveis de coesão social e de tarefa afectada por tipo de treino, e na presença de um estímulo espontâneo indutor de stress. Para tal criou-se um desenho experimental 2x2 inter-sujeitos. Pediu-se aos participantes que imaginassem um cenário fictício onde fizessem parte de uma de duas equipas. Estas equipas estariam envolvidas num projecto de investigação. As condições foram manipuladas de modo a que ambas as equipas treinassem em conjunto, ou separadamente. Também foi manipulada uma situação de crise indutora de stress. Durante o projecto de investigação poderia ocorrer uma crise que afectaria a multi-equipa, ou poderia não ocorrer. Seguidamente, os participantes tinham que responder a um questionário que media coesão social e de tarefa. Verificou-se um maior nível de coesão de tarefa para treino conjunto do que para treino separado. Esta diferença não foi verificada para coesão social. As condições de crise tiveram como resultado menores níveis de coesão social e de tarefa. Por fim, não se verificou que os níveis de coesão social e de tarefa fossem maiores em multi-equipas que treinassem em conjunto, em condições de crise, do que em multi-equipas que treinassem separadamente. Futuras oportunidades de investigação sobre coesão em sistemas multi-equipa são exploradas na discussão.

Palavras-chave: sistemas multi-equipa, coesão de equipa, treino de equipa, adaptação de equipa**,** estímulos de adaptação

Abstract

The literature regarding multiteam systems (MTSs) has increased significantly over the last decade, however there is still a need to comprehend how task and social cohesion work in these systems. Multiteam systems often work in fast-changing, extreme environments, which require specialized training and high levels of cohesion in order to adequately deal with possible challenges. One area where little research has been conducted is on the effects of training on cohesion at the multisystem level. The present research addresses this gap by investigating how social and task cohesion levels vary by type of training, and in the presence of acute stress-inducing triggers. An experimental 2x2 between subjects design was created, which required individual participants to picture a fictitious scenario in which they belonged to one of two teams participating in a research project. Conditions were manipulated so as to indicate that teams either trained together or separately. A stress-inducing crisis situation was also manipulated. During the project, a crisis affecting the team could occur or not occur. Participants would then complete a questionnaire measuring social and task cohesion. It was found that joint training resulted in higher task cohesion over separate training; no such difference was found for social cohesion. Crisis conditions resulted in lower social and task cohesion levels. Finally, no support was found for higher social and task cohesion for multiteams who trained together when facing an adaptation trigger, over multiteams who trained separately. Future research opportunities into MTS cohesion are explored in the discussion.

***Keywords**:* multiteam systems, team cohesion, team training, team adaptation, adaptation triggers

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Index of abbreviations

MTS – Multiteam system;
KSAs – Knowledge, skills and abilities;
IPO – Input, process, outcome;
IMO – Input, mediator, outcome.

Introduction

There has been an increase in team-based structures within organizations over the past few years (Kozlowski & Bell, 2003; Kozlowki & Ilgen, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008). As the use of teams grows, so do the interactions between these teams, within organizations (DeChurch & Mathieu, 2009; West, 2012). As work demands become increasingly complex, organizations are progressively turning toward larger systems comprised of multiple teams to accomplish multifaceted tasks in challenging environments (Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005). Two or more interdependent teams which share proximal goals, are defined as a multiteam system (MTS) (DeChurch & Mathieu, 2009). Many organizations are now dependent on these complex systems to achieve their dynamic goals (Suffler, Rico, & Salas, 2014). For example, the primary driver of mission success in spaceflight missions is the MTS focusing on the coordination between NASA astronauts and NASA Mission Control (Vessey, 2014). The impact these multiteams have on organizational success has brought to focus the need to understand how they function together (Resick, Burke, & Doty, 2012). Another reason propelling this line of research is the frequent use of MTSs to address large and complex challenges where the costs of failure are immense (e.g. emergency disaster response, humanitarian relief, corporate strategic alliances) (Resick et al., 2012). Understanding how to improve the outcomes of these MTSs is becoming increasingly more important.

Team outcomes include, but are not limited to, performance (Cohen & Bailey, 1997). A team's performance is influenced by many variables (Mathieu et al., 2008). Of these variables, one of the most studied within the team literature is cohesion (Mathieu, Kukenberger, D'Innocenzo, & Reilly, 2015). There are many views on cohesion (for a review see McLeod & von Treuer, 2013). There is, however, little disagreement among scholars that cohesion is a critical aspect of team functioning (Grossman, Rosch, Mazer, & Salas, 2015). One view states that cohesion represents the commitment of team members to the team's overall task, or to each other (Goodman, Ravlin & Schminke, 1987). According to Casey-Campbell and Martens (2009), cohesion is a shared bonding or attraction driven by the task and social features of a team, and which causes members to remain together.

Grossman (2014) points out that several meta-analyses have been conducted, each demonstrating a positive link between cohesion and performance (e.g., Gully, Devine, & Whitney, 1995; Beal, Cohen, Burke & McLendon, 2003; Chiocchio & Essiembre, 2009).

It is important to note that although extensive research about how teams work

individually has been conducted (see Mathieu et al., 2008), the need for more empirical work on MTS has been expressed (DeChurch & Mathieu, 2009). For example, DiRosa (2009) stated that most studies on cohesion focused at the team-level, with little being known about cohesion's manifestation among multiple teams. But while some authors state that traditional team and organizational research cannot fully explain the nuances of MTSs (Mathieu, 2012), Connaughton, Williams and Shuffler (2012) argue that even though there are distinctions between MTSs and teams, much of what is known about teams may be applicable.

The first objective of this study is to fill a gap in literature, regarding MTS training. According to David & Keeton (2011), it is necessary to understand the role of team training in professions characterized by long periods of routine or mundane activity punctuated by high-risk crisis situations (e.g. space missions). Goldstein and Ford (2002) define training as a systematic, planned intervention aimed at facilitating the development of job-related knowledge, skills and abilities (KSAs). In MTSs, teams can train together or separately. Because team training was found to have a positive relationship with team cohesion (Grossman, 2014) the present study aims to examine if social and task cohesion, within MTSs, differ when MTS teams train together or separately in a non-crisis condition.

Understanding what happens to MTS cohesion during a crisis situation is also important. Some MTSs exist and work in fast-changing, extreme environments (e.g. NASA mission crews) (Vessey, 2014). Within these environments the need to adapt to unexpected situations is ever present (Maynard & Kennedy, 2016). Cohesion plays an important role in a team's adaptation (Maynard, Kennedy, Sommer & Passos, 2015). However, there is a need to further examine this relationship between cohesion and adaptation (Maynard & Kennedy, 2016). How will MTS cohesion (commitment to the overall task, or to each other) differ when teams face unexpected stress-inducing situations, and must adapt?

As such, the second aim of this experimental study is to observe, within MTS, to what extent do social and task cohesion levels vary when faced with an unexpected stress-inducing crisis condition?

Seeing as an MTS' cohesion might be affected by a stressful situation, the final objective of this study is to observe if MTSs' social and task cohesion levels differ for teams who train together or separately, when facing a stress-inducing crisis condition. This objective aims to understand if, in the presence of a crisis trigger, joint training results in higher cohesion levels than separate training.

Literature Review and Hypotheses

Teams and Multiteam Systems

Kozlowski and Bell (2003) define work teams as collectives who exist to perform organizationally relevant tasks. These collectives "share one or more common goals, interact socially, exhibit task interdependencies, maintain and manage boundaries, and are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity" (p.334). They are distinguishable from work groups, in the sense that groups are usually more loosely constituted (Salas et al., 2008). Salas and colleagues (2008) mention that even though work groups are collectives that may be perceived as social entities, and may even have common goals, they also possess task connections that are less well defined (e.g., juries, committees, councils), than in teams.

Teams vary in function and life course in a variety of ways (West, 2012). And they do so because different types of teams face different demands under distinct conditions (Mathieu et al., 2008). Understanding these conditions is crucial to comprehending how teams function effectively. More than 50 years ago, McGrath (1964) advanced an input-process-outcome (IPO) framework for studying team effectiveness. This framework has since been worked upon and modified into another, more complex framework (Mathieu et al., 2008). Ilgen, Hollenbeck, Johnson, and Jundt (2005) coined this new framework the input-mediator-outcome (IMO) team effectiveness framework to differentiate it from the standard IPO framework (the framework is depicted in Appendix A).

Mathieu and colleagues (2008), in their review of team effectiveness, clarified what has been studied within the literature, and explained the IMO framework:

> *Inputs* describe antecedent factors that enable and constrain member's interactions. These include *individual member characteristics* (e.g. competencies, personalities), *team-level factors* (e.g. task structure, external leader influence), and *organizational* and *contextual factors* (e.g. organizational design features, environmental complexity). These various antecedents combine to drive team processes, which describe member's interactions directed towards task accomplishment. Processes are important because they describe how team inputs are transformed into outcomes (p. 412).

Marks and colleagues (2001) propose that teams engage in three types of processes, namely *transition*, *action* and *interpersonal*. During *transition team process* phases, members

are engaged in activities such as mission analysis, planning and goal specification. Subsequently, during *action* phases, members address task accomplishment, monitoring progress and systems, coordinating with team members, as well as monitoring and backing up teammates. Finally, *interpersonal processes* are salient throughout a team's lifecycle. They address activities such as conflict management, motivation and confidence building, and affect management. (Maynard, Kennedy, & Sommer, 2015, p.4). However there are many aspects that mediate the influence of team inputs on outcomes, which are not processes (Ilgen et al., 2005). Team processes involve members' actions, whereas other mediating mechanisms are better conceived of as cognitive, motivational or affective states (Mathieu et al., 2008). These states are referred to as *emergent states.* Among many emergent states that have received significant attention during the past decade, one of the more thoroughly studied is cohesion (Kozlowki & Ilgen, 2006). Team cohesion directly affects a team's outcomes (Mathieu, 2015). Within the IMO framework *outcomes* are results and by-products of team activity (Mathieu et al., 2008). They may include *performance* (e.g., quality and quantity) and member's *affective reactions* (e.g., satisfaction, commitment, viability).

According to Ilgen and colleagues (2005) there has been a shift in research from questions such as "what predicts team effectiveness and viability?" to other, more complex questions regarding why some groups are more effective than others (p.518). For example, Serfaty and colleagues (1998) found that teams who maintain superior performance under high levels of workload stress have been shown to employ different coordinating strategies than low-performing teams do. By looking at the differences between teams and identifying what can be improved in low-performing teams, one can increase their overall output. This new perspective is especially relevant when considering that within organizations teams are sometimes required to cooperate with one another to achieve a specific goal (West, 2012). This is many times done because, in the modern workplace, many organizational challenges lie beyond the scope of any single team (Firth, Hollenbeck, Miles, Ilgen, & Barnes, 2015). Under these circumstances, a network of teams (a multiteam system) is required (Zaccaro, Marks, & DeChurch, 2011). According to Shuffler and colleagues (2014), MTSs have expanded beyond the original settings where they were first recognized (e.g., military and business) and are now used in several other contexts such as medicine, emergency response, space aviation and many other environments where work demands are becoming increasingly complex (p.11). It should be noted that MTSs are more than just large teams. Mathieu, Marks and Zaccaro (2001) define MTS as

> (…) two or more teams that interface directly and interdependently in response to environmental contingencies toward the accomplishment of collective goals. MTS boundaries are defined by virtue of the fact that all teams within the system, while pursuing different proximal goals, share at least one common distal goal; and in doing so exhibit input, process, and outcome interdependence with at least one other team in the system (p. 290).

The constituent entities of an MTS are teams, referred to as *component teams*. They are distinguishable entities capable of independent actions that pursue different proximal goals (not shared with other teams in the system) (Mathieu, 2012). However, they all act in concert towards a superordinate distal goal, which could not be accomplished by a single team. The failure of a single team could jeopardize the realization of the distal goal (DiRosa , Estrada, and DeConstanza, 2015). Mathieu and colleagues (2001) provide an example in the form of an emergency response team. Consider a hypothetical MTS consisting of four teams, namely firefighters, paramedics, doctors, and a recovery team. Each team has its own proximal goal (e.g. the firefighters' main goal is to extinguish a fire, while the paramedics' primary goal is to take injured people to the hospital), however they all act towards a superordinate goal which is to save lives. As can be seen by the example, MTS outcomes are greater than the sum of individual team outputs (DiRosa et al., 2015).

MTSs are typically larger in size than most teams, but smaller than their embedding organizations (Zaccaro et al., 2012). Also, an MTS can be composed of teams that belong to different organizations (Zaccaro et al., 2012). MTSs, which belong to only one organization, are referred to as *internal MTSs*; those which are composed of teams from different embedding organizations are referred to as *cross-boundary MTSs* (Mathieu et al., 2001).

Zaccaro and colleagues (2012) point out that "the joint and separate actions of component teams can become quite complex in their interdependence" (p. 11), a complexity which differs considerably from individual teams (DiRosa, 2009). For example, Hinsz and Betts (2012) mention that many types of conflict are common to both individual teams and multiple teams working in concert. The authors state, however, that the occurrence and severity of these conflicts tends to be higher in multiple-team situations. Because of the complexity surrounding MTSs, the way these systems' effectiveness is assessed is different from that at an individual team level (Shuffler, Jiménez-Rodríguez, & Kramer, 2015; Zaccaro et al., 2012). In order to unify the literature, Shuffler and colleagues (2015) integrated previous MTS effectiveness models (Zaccaro et al., 2012) within the IMO framework.

DiRosa and colleagues (2015) state that as the MTS research continues to grow, there will be a need to expand and perhaps even redefine concepts originally confined to the team level. According to the authors, this must be done in order to "accommodate the increased complexity of teams operating within a system" (p. 26). Seeing as cohesion is a desirable emergent state for its critical role in team functioning (Kozlowki & Ilgen, 2006), its manifestation between teams will be vital not only for the success of an MTS, but also to understand cross-team processes that occur within MTSs (DiRosa, 2009).

Social and Task Cohesion

A team's cohesiveness was defined by Festinger, Schachter, and Back (1950) as "the total field of forces which act on members to remain in the group" (p.164). This initial unidimensional view of cohesion was criticized for being too general and vague, with some authors stating it was difficult to convert into concrete measures and concepts (Craig & Kelly, 1999). Since then a multidimensional view of cohesion has emerged (Chiocchio & Essiembre, 2009). However, McLeod and von Treuer (2013) state that "there is a lack of consistency in the literature regarding almost every aspect of cohesion research. This includes its definition, conceptualization, and measurement" (p.7). Nonetheless, one of the most widely used definitions in the literature is the one proposed by Carron, Widmeyer and Brawley (1997) who defined cohesion as "a dynamic process which is reflected in the tendency for a group to stick together and to remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (p.3).

MTS cohesion follows the original conceptualization of group cohesion and is defined as "the bonds among entities that contribute to synergistic functioning of a larger unit" (Dirosa et al., 2015, p. 33).

There have been several proposed models of cohesion (for a review see McLeod & von Treuer, 2013). According to Grossman (2014), one of the most accepted models is a three-dimensional approach, in which cohesion is composed of *social cohesion*, *task cohesion* and *group pride*. *Social cohesion* refers to a shared liking and bonding among team members (Beal, et al., 2003), as well as the closeness among group members (MacCoun, 1996). A group is socially cohesive to the extent that its members prefer to spend their social time together and enjoy each other's company (MacCoun, 1996). *Task cohesion* corresponds to a group's shared commitment or attraction to the group task or goal (Hackman, 1976, as cited in Chiocchio & Essiembre, 2009), and the motivation to coordinate team efforts to achieve common work-related goals (MacCoun, 1996). The third major dimension of cohesion, *group*

pride, is however harder to classify than the others (Grossman, 2014). This dimension has received little attention in the literature and studies focusing on it appear to be mainly with sports teams (Chiocchio & Essiembre, 2009). It should be noted, however, that many studies do not consider this dimension, and those who do, do not always follow the same conceptualization (McLeod & von Treuer, 2013). According to Beal and colleagues (2003) *group pride* is conceptualized as the shared importance of being a part of a team, or the shared sense of honor derived from being a team member. Grossman (2014) argues that pride can be driven by both social- and task-focused team characteristics, in that, members may take pride in social aspects of a team (e.g. team social status, the ideologies the team represents) or that pride can be derived from task-focused characteristics of a team, such as its overarching purpose, its resources, and its history of successful performance. This demonstrates that the different dimensions within cohesion may affect one another (Grossman, 2014).

An emergent state, team cohesion takes time to develop and solidify (Mathieu et al., 2015). This means that there is a period before team members become acquainted and develop some kind of attraction (Chiocchio & Essiembre, 2009). Also, the various dimensions of cohesion are not always present or equally salient throughout the life of a group (Carron & Brawley, 2012). For instance, when a group of strangers is first formed for the purpose of achieving a goal, task cohesion is likely to be high in an initial phase; later members might take the time to interact socially, become familiar with each other beyond work, and thus develop social cohesion (Carron & Brawley, 2012). Once a team goal has been achieved, social cohesion is likely to be high (McLeod & von Treuer, 2013).

As stated earlier, a significant correlation between cohesion and a wide variety of outcomes including team performance, as well as positive member attitudes, has been demonstrated (Greer, 2012). Different dimensions of cohesion, however, have different effects on team outcomes. For example, a study by Zaccaro (1991) demonstrated that there was a stronger relationship between task cohesion with a variety of task-relevant criteria (i.e., performance processes, role uncertainty, absenteeism, individual performance) than there was for social cohesion.

Social and task cohesion can be obtained through training (Grossman, 2014).

Team Training

Training is a planned intervention which is designed to facilitate the acquisition of job-related KSAs (Goldstein & Ford, 2002). Within an organization training can occur at an

individual or team level (Hollenbeck, DeRue, & Guzzo, 2004). Mathieu and colleagues (2008) state that it is mostly agreed that training which is designed to develop task-relevant skills should be directed at individual team members. On the other hand, some authors believe that in order to train skills for effective team functioning, it is best to apply training to intact teams instead of individual members (e.g. Cannon-Bowers, Tannenbaum, Salas & Volpe, 1995). This is because in team training members are able to integrate teamwork skills and jointly practice complex coordinated actions (Mathieu, 2008). According to Hollenbeck and colleagues (2004) the advantages of team training relative to individual training are primarily a result of team interactions and team leader support. Salas and Cannon-Bowers (1997) define team training as "a set of tools and methods that, in combination with required [team-based] competencies and training objectives form an instructional strategy" (p. 254). As such, training must have an objective. Namely it must specify what is to be learned (Gagné, 1962 as cited in Salas et al., 2008). Once the objectives are chosen, the training environment should be tailored in order to achieve them in the most efficient way possible (Salas et al., 2008). For an optimal team training result, organizations must identify the best combination of tools (e.g., team task analysis), delivery methods (e.g., practice based, information based, demonstration based), and content (e.g., knowledge, skills, attitudes) (Salas & Cannon-Bowers, 1997).

Salas and colleagues (2008) point out that, for many industries, enhancing teamwork through team training is a major concern. This is because it is believed that team training is critical for effective team performance (Hollenbeck et al., 2004). Supporting this notion, Noe, Dachner, Saxton and Keeton (2011) note that meta-analyses strongly suggest that team training has a positive influence on team effectiveness. The authors also mention that studies have shown that team training is related to improvements in specific team processes and skills. There are, however, many types of team training to develop different skills.

Types of team training. Salas and colleagues (2008) point out that there are many types and forms of training (e.g., assertiveness training, crew resource management, cross-training, group process training, problem-solving training, task-focused simulation training). Taking into account that training is designed to develop certain competencies, Cannon-Bowers and colleagues (1995) developed a framework which distinguishes types of competencies. As such, they consider competencies to either be *task-related* or *team-related*, and *generic* (can be applied across team and task contexts) or *specific* (related to the context of the team or the task). Task-focused team training enables team members to become aware

of, learn about, and practice requisite team competencies and performance processes while receiving feedback on their performance. They aim to develop task-specific knowledge skills and attitudes. In contrast, training interventions targeting teamwork KSAs are focused on improving how individuals work together effectively as a team (e.g. developing member's ability to communicate and coordinate their actions with others). Usually in a team's initial phase, it is custom to focus on the development of taskwork competencies as a foundation for the development of teamwork competencies in later stages (Kozlowski, Watola, Jensen, Kim, & Botero, 2009). Salas and colleagues (2008) argue that every team training intervention targets some combination of taskwork or teamwork skills. By focusing on task and interpersonal relations, members are more satisfied, committed, identified and adjusted to the team (Kozlowski et al., 2009). In a meta-analysis conducted by Salas and colleagues (2008), the authors found that both teamwork and taskwork training were positively related to enhancements in team-level cognitive outcomes (e.g. development of shared mental models), affective outcomes (e.g. collective efficacy, cooperation), behavioral processes (e.g. strategy development, self-correction, decision-making), and performance outcomes (e.g. efficiency, task effectiveness). Interestingly, they found differences in types of training in relation to the outcomes; they do caution about the interpretation of their findings due to different effect sizes used. For example, their results indicated that teamwork and mixed content training (focus on teamwork and taskwork) worked better for process outcomes than taskwork training. Also, teamwork-focused training appeared to result in enhanced affective taskwork outcomes in comparison with taskwork training. One interesting result found that team training with a mixed content was not found to be superior to team training focusing either on teamwork or task work. Salas and colleagues (2008) conclude by mentioning that there is insufficient evidence to assert that mixed content interventions are superior to taskwork or teamwork interventions alone.

According to Noe and colleagues (2011), there have been several attempts to develop team-training programs with the most effective design and delivery methods. A clear example is the method by which NASA trains its astronauts (Maynard & Kennedy, 2016; Noe et al., 2011; Vessey, 2014). Astronauts must undergo rigorous training in order to be prepared for long-duration missions. Parts of their training may involve simulations and challenges that lead team members to experience high levels of stress and occasionally face critical incidents (Burke, Stagl, Salas, Pierce, & Kendall, 2006). Stress can be defined as a high demand, high threat situation that disrupts performance (Driskell, Salas, & Johnston,

2006). Broadly used, stress refers to high-demand, high-risk task conditions which require quick and effective task performance (Driskell, Salas, Johnston, & Wollert, 2008).

Space (e.g., the International Space Station), along with capsule simulation habitats, and nuclear submarines are among what Orasanu and Lieberman (2011) define as "isolated confined extreme environments" (p. 4). By requiring life-sustaining or protective habitats and equipment, these environments impose a number of constraints on human well-being and performance. The environments are inherently hostile (e.g. the closed atmospheres create risks associated with fires and toxic fumes) and present several physical, psychological, habitability (e.g., lack of habitable space) and interpersonal stressors (Kanas & Manzey, 2003). Imminent danger in the face of critical systems failure is also a constant stressor (Orasanu & Lieberman, 2011). As such, teams undergo intense training before a mission begins. In some cases training may include emergency response exercises (Berg, Grieger, & Spira, 2005).

David & Keeton (2011) indicate that recent research on isolated and confined environments suggests that training must include realistic simulations that test corporate citizenship, interpersonal skills, and emphasize metacognitive skills that enable trainees to solve problems in dynamic, uncertain environments. This type of training also appears to be beneficial after a crisis event occurs. For example, Berg and colleagues (2005) examined the stress reaction of a U.S. Navy submarine research crew forced to abandon ship after flooding and shipboard fires. They concluded that "individuals who volunteer for work in high-risk situations are carefully screened, receive training to respond to specific disasters, and are less likely to experience traumatic *sequelae* following a disaster, than those who lack such training" (p.47).

Stachowski, Kaplan, and Waller (2009) found that training should emphasize the use of protocols as tools but not rigid guides for interaction in crisis events. This is important for MTS training because these often face crisis situations that require quick responses.

Training in MTS. Simply enhancing the effectiveness of component teams does not ensure that they will be more effective as a collective (DeChurch & Mathieu, 2009). It is necessary that the "whole" works. In accordance, Noe and colleagues (2011) state that the success of a long-duration space mission is dependent not only on the collaboration and coordination of flight crews, flight controllers, and other teams on the ground, but also between the teams that make up the larger multiteam system. As such, team training for long-

duration missions should emphasize both within and inter-team coordination, as well as collaboration. Other authors have also emphasized the need for joint training between astronauts and ground control (e.g., Kanas et al., 2009; Maynard & Kennedy, 2016).

Other than training, there are several other critical aspects that influence the success of long-term space missions, namely cohesion. Dion (2000) points out that team cohesion should be reinforced in training. In their review, Noe and colleagues (2011) mention that "team cohesion needs to be monitored continuously, crews need to be trained in cohesion-building skills, and training needs to build team identification (rather than subgroup identification) to avoid problems of in- and out-group dynamics" (p. 10).

Training and Cohesion. Training has been found to have a positive relationship with cohesion in multiple studies. For example, Carron and Spink (1993) found that a team building training program implemented over the course of several weeks increased cohesion and attraction to group-task within two different exercise groups. Also, Deeter-Schmelz and Kennedy (2003) found that higher quality team training was associated with higher levels of cohesion in patient care teams. Grossman (2014) conducted a meta-analysis in which she coded types of team interventions and analyzed their relationship with cohesion. She distinguished between task training, team building, and other non-training interventions such as facilitators or tools. She found that all team interventions had a positive relationship with cohesion. Interestingly she found no significant differences in cohesion levels across intervention types.

Taking into consideration the proven relationship between training and cohesion; the fact that that every team training intervention targets some combination of taskwork or teamwork skills (Salas et al., 2008), thus potentially enhancing both social and task cohesion, and the emphasis on the need for joint training between component teams within MTSs (Kanas et al., 2009; Noe et al., 2011), I propose hypothesis 1a) and 1b).

Hypothesis 1a) – Task cohesion will be higher for groups who had joint training than groups who had separate training.

Hypothesis 1b) – Social cohesion will be higher for groups who had joint training than groups who had separate training.

Some authors point out that that although training is important, there are events that a team will face which will be unique and unpredictable (e.g. challenges faced by space crews)

(Orasanu & Lieberman, 2011). While training should explicitly address the best strategy for approaching crisis and uncertainty, as well as what decision making will be encountered under stress, it is difficult to train for every experience one might encounter (Driskell, Salas and Johnston, 2001; Noe et al., 2011). As such, training by itself is not sufficient. MTSs must also be adaptive.

Adaptation

Teams are currently considered complex and dynamic entities, which adapt and evolve over time (Ilgen et al., 2005; Mathieu, et al., 2015). According to Maynard, Kennedy and Sommer (2015) the topic of team adaptation has gained popularity in the past decade and a half, with many researches providing different labels for the same constructs. As such, within their review of the team adaptation literature, Maynard, Kennedy and Sommer (2015) provided a framework based on the IMO model (Ilgen et al., 2005), in order to clarify the subject (this framework is presented in Appendix B). The authors conceptualize team adaptation as a process that mediates the relationship between input variables and team adaptive outcomes. They define *team adaptation* as "adjustments to relevant team processes (i.e. action, interpersonal, transition) in response to the disruption or trigger giving rise to the need for adaptation" (p.5). In their view, the initial question regarding a team's adaptation is *whether or not it has the inherent capacity to adapt when needed.* As such, an important antecedent variable of the team adaptation processes is team adaptability (Maynard, Kennedy & Sommer, 2015). *Team adaptability* is defined as "the capacity of a team to make needed changes in response to a disruption or trigger" (Maynard, Kennedy, & Sommer, 2015, p. 4), and serves as an input variable. An *adaptation trigger* is thus a cue that prompts teams to pursue modifications in order to complete their task (Maynard, Kennedy, & Sommer, 2015).

Maynard and Kennedy (2016) state that a team's adaptability is likely derived from individual-level factors that have been demonstrated, in the literature, to shape individual adaptation (e.g. personality factors, individual characteristics such as the ability to remain calm, flexible and open-minded) (Maynard et al., 2015). This may result in some teams inherently possessing a higher capacity to adapt, in part, based on the characteristics possessed by team members and leaders (Maynard and Kennedy, 2016). According to Salas, and colleagues (2008), a team's adaptability is an essential component of teamwork, especially for teams operating under dynamic conditions. Teams must adjust their focus, priorities and actions in order to respond to new challenges (Burke et al., 2006). Also, the challenges faced by teams vary significantly. These challenges can be broadly distinguished

as *chronic* or *acute* (Alliger, Cerasoli, Tannenbaum, & Vessey, 2015). Alliger and colleagues (2015) define *chronic* challenges as "difficult circumstances of an ongoing or long-lasting nature" (p.177) (e.g. noisy work environment, ambiguous team roles). On the contrary, *acute* challenges "have a sudden or rapid onset; they are short-lived but typically more intense than chronic challenges" (p.178). A sudden loss of resources is an example of an acute stressor. Maynard, Kennedy and Sommer (2015), note that the type and severity of the trigger and situation is likely to shape the adaptation process.

Training and Adaptation. Team training has been found to have a positive relationship with adaptation (Serfaty, Entin, & Johnston, 1998). In fact, Maynard and colleagues (2015) mention that team training appears to be the most researched manner by which practitioners can enhance the adaptation of their teams. In some cases, however, it is under debate whether current training programs actually enhance adaptability levels in teams (e.g. in NASA training programs) (Maynard, Kennedy & Sommer, 2015).

Team Adaptation and Cohesion. Another line of research to be explored, according to Maynard, Kennedy, Sommer and Passos (2015), is the interplay between adaptation and cohesion within teams. These authors suggest that team adaptation and cohesion have a reciprocal relationship with each other. They analyze this relationship, within a framework they propose (Appendix C). On the basis that team adaptability is a continuum, at one end are teams that do not possess the ability to adjust when disruptions emerge (brittle teams), and on the other are teams that are more flexible when a disruption emerges (elastic teams). When an adaptation trigger occurs, teams will use the appropriate process or processes (action, transition or interpersonal) to address the disruption. However, researchers have brought into question whether a team even wants to adapt in the face of a trigger (Maynard, Kennedy, Sommer, et al., 2015). Only when this decision is made, does the framework proposed by Maynard and colleagues (2015) come into play. Teams that are responsive to environmental cues are apt to garner enhanced confidence levels and teams who are confident tend to have enhanced levels of cohesion (Hirschfeld, Jordan, Field, Giles, & Armenakis, 2005). Maynard, Kennedy, Sommer and Passos (2015) propose that if a team faces multiple disruptions over the course of its lifecycle and is effective in dealing with them, its cohesion will likely increase. Conversely, when a team faces multiple disruptions but is not successful in handling the disruptions, its cohesion levels tend to remain low. The literature proposes that people, and consequently teams, might respond in different manners to an acute trigger. On

the one hand, "exposure to stressors does not necessarily produce negative effects, particularly for experienced personnel" (Flin, O'Connor, & Crichton, 2008, p. 175). In fact, there may be immediate positive effects such as increased motivation and energy, faster reactions, clearer thinking and improved memory retrieval (Orasanu & Baker, 1996). On the other hand, it has been well documented that stressful situations may induce panic, a condition which can even impair professionals from performing as trained (Staal, Bolton, Yaroush, & Bourne Jr, 2008). Impaired decision-making is expected during periods of high stress levels (Hancock, Harris & Harris, 2001, p. 901). At the team level, "it may be that only one team member needs to be affected by stress for the team's performance to be significantly degraded" (Flin et al., 2008, p.179). Team members are more likely to become focused on their own tasks and there could be failures in team working, communication and decision-making (Flin et al., 2008). Flin and colleagues (2008) provide the example that in an emergency response situation, poor teamwork may lead to failure in managing an incident effectively. Taking this into consideration, along with the notion that adaptation triggers can sometimes be acute stressors, I propose hypotheses 2a) and 2b).

Hypothesis 2a) – Task cohesion is likely to be lower when an adaptation trigger occurs than when an adaptation trigger does not occur.

Hypothesis 2b) – Social cohesion is likely to be lower when an adaptation trigger occurs than when an adaptation trigger does not occur.

Adaptation, Training and Cohesion

The relationship between training and cohesion, training and adaptation, and between adaptation and cohesion has been established. However the literature is lacking when considering all three together. It stands to reason that teams who have trained together will perform better than those who trained separately when facing an adaptation trigger. But how will cohesion be affected under the same circumstances? I propose hypotheses *3a)* and *3b)*.

Hypothesis 3a) – Task cohesion is likely to be higher in teams that have trained together when an adaptation trigger occurs, than in teams that have trained separately.

Hypothesis 3b) – Social cohesion is likely to be higher in teams that have trained together when an adaptation trigger occurs, than in teams that have trained separately.

As multiteam systems frequently operate in adverse conditions, it is difficult for researchers to collect real-time data in field-research studies (Resick et al., 2012). According to Resick and colleagues (2012), the use of laboratory research can diminish some of the hardships faced by researchers when conducting field research with an MTS. They state that by isolating key variables, basic relationships can begin to be examined. This is what is intended in the present study.

Method

Procedure

Participants were required to complete an online survey through Qualtrics in a computer laboratory setting. Subjects were randomly assigned to each computer, which provided all the instructions, presented the questions and registered the answers. Before starting the survey, participants had to agree to the informed consent form. It explained that participants had 3 tasks to complete. All tasks started by requiring the participant to imagine 2 teams – team Alpha, and team Beta. The participant was then assigned to one of these teams on what appeared to be a random basis (in reality, however, each participant was assigned to team Alpha). This method of assignment was based on the minimal group paradigm (MGP) (Tajfel, Billig, Bundy, & Flament, 1971). This paradigm illustrates how being assigned to a novel arbitrary group that does not directly serve one's self-interest is enough to generate a competitive orientation as a function of in-group – out-group distinctions (Brewer, 1979). Simply put, merely categorizing individuals into two different social categories is enough to elicit in-group favoritism and/or out-group derogation (Otten & Moskowitz, 2000). This is explained by Social Identity Theory (Tajfel, 1978; Turner & Tajfel, 1986), which claims that a group provides a basis for self-definition (van Leeuwen, van Knippenberg, & Ellemers, 2003). Hornsey (2008) explains that in Social Identity Theory "self-concept will mostly comprise one's 'social identity', defined as those aspects of an individual's self-image that derive from the social categories to which he/she belongs, as well as the emotional and evaluative consequences of this group membership" (p. 206). Thus, group members are usually motivated to preserve their group and its distinctiveness from other groups (van Leeuwen et al., 2003).

Participants were required to picture a fictitious scenario in which both teams (Alpha and Beta) would be participating in a marine biology expedition project. Within this project, team Alpha would be piloting a submarine, and team Beta would be providing support to team Alpha, from a ship on the surface. Teams Alpha and Beta had identical objectives.

Participants were presented with one of four varying conditions, as the experimental design was 2x2 between subjects. The conditions corresponded to the manipulation of two independent dichotomous variables: training, and adaptation. Thus, teams Alpha and Beta could have trained together or separately for the expedition; during the mission there could be (or not) an emergency situation to which the team had to adapt, as follows:

It has been a while since teams Alpha and Beta have received their specific training, and the expedition is underway. Team Alpha is inside the submarine, many meters deep. Team Beta is on the ship, on the surface. Imagine that during the period that team Alpha is inside the submarine there is a breakdown in the oxygen supply system and the lives of Alpha team members are at stake.

The other condition clarified that during the period that team Alpha was inside the submarine no incident occurred inside the submarine.

As was previously mentioned, critical systems failure, in missions taking place in extreme environments, can place individuals at risk (Orasanu & Lieberman, 2011). According to Pleil and Hansel (2012) when developing instruments to support human life in confined environments (e.g. submarines and spacecraft), one of the main concerns is air monitoring. Failure in the oxygen supply system would imply that oxygen levels would decrease, thus endangering team members' lives.

All tasks were randomly assigned to control for order effect and eventual effect of individual traits. At the end of the task, participants were asked to regard both teams (Alpha and Beta) simultaneously and then rate the cohesion between teams.

After completing each task, participants were thanked for their participation and had to answer some verification questions, namely if they remembered which team they belonged to, if the teams had identical or different objectives, if the teams had trained together or separately and if something had occurred during the expedition. Afterwards, participants were required to fill out some demographic information (age, gender and academic qualifications).

The survey took around 30 minutes to complete. Each participant answered the survey only once.

Participants

A total of 167 psychology undergraduate students voluntarily participated in the experimental study in exchange for school credits. The sample was collected between the months of January and April of 2016 at the Instituto Superior de Psicologia Aplicada (ISPA), in Lisbon. Fifty students answered the final verification questions incorrectly, which led to the exclusion of their responses. The final sample was thus composed of 117 students (28 male, 89 female). Ages ranged between 18 and 54. Mean age was 20.99 years (SD = 5.07 years).

Even though it is debated whether or not to use students samples in research

(Gallander Wintre, North, & Sugar, 2001), Chiocchio and Essiembre (2009) state that including student teams in research on cohesion and performance is pertinent because teams of undergraduate or graduate students are as real as any other type of teams.

Measures

Cohesion: The measure used in the present study was an adapted version of the ten-item *Team Cohesion* (TC) *scale* by Carless and De Paola (2000). The TC scale measures cohesion in organizational settings and is based on a three-factor model proposed by the same authors. It compromises task cohesion, social cohesion, and individual attraction to the group. Task cohesion refers to the "extent to which the team is united and committed to achieving the work task" (p.79); social cohesion, "the degree to which team members like socializing together" (p.79); individual attraction to the group, "the extent to which individual team members are attracted to the group" (p.79).

Task Cohesion: This scale measured task cohesion according the above-cited definition by Careless and De Paola (2000). Task cohesion was measured with two items in a five-item Likert scale 1 (=*"not at all likely"*) to 5 (=*"very likely"*). Items were taken from Costa's (2014) adaptation of Carless and De Paola's (2000) TC scale into Portuguese. The items included: "Probability of teams Alpha and Beta being united in trying to reach the project's goals"; "Probability of teams Alpha and Beta being satisfied with each other's level of commitment to the research project." Internal consistency (Cronbach's α) was 0.76.

Social Cohesion: This scale measured social cohesion according the above-cited definition by Careless and De Paola (2000). Social cohesion was measured with three items in a five-item Likert scale 1 (=*"not at all likely"*) to 5 (=*"very likely"*). Items were taken from Costa's (2014) adaptation of Carless and De Paola's (2000) TC scale into Portuguese. The items included: "Probability of teams Alpha and Beta liking to spend time with one another"; "Probability of teams Alpha and Beta having fun together;" "Probability of teams Alpha and Beta wanting to party together." Internal consistency (Cronbach's α) was high: 0.93.

Results

The data were analyzed to verify that it was normally distributed. Skewness and Kurtosis values were within absolute values of 0.005 and 1.473. The statistical analysis of the data collected from the questionnaires was made resorting to the Statistical Package for the Social Sciences (SPSS), version 21.

Hypotheses testing

H1a) proposed that *"task cohesion will be higher for groups who had joint training than groups who had separate training."* To verify this, an independent-samples t-test was conducted to compare task cohesion when teams Alpha and Beta trained together and separately. Joint training (M = 3.75, SD = .78) was associated with significantly higher levels of task cohesion than separate training (M = 3.43, SD = .75), t (115) = 2.19, p = .03. Thus *H1a)* was supported.

H1b) stated, *"Social cohesion will be higher* for *groups who had joint training than groups who had separate training"*. To verify this, an independent-samples t-test was conducted to compare social cohesion when teams Alpha and Beta trained together and separately. Joint training (M = 3.36, SD = .90) and separate training (M = 3.13, SD = .84) did not differ significantly on social cohesion levels, t (115) = 1.38, p = n.s. Thus *H1b)* was not supported.

H2a) stated that *"Task cohesion is likely to be lower when an adaptation trigger occurs than when an adaptation trigger does not occur."* To verify this, an independent-samples t-test was conducted to compare task cohesion when an adaptation trigger occurred and when an adaptation did not occur. Significantly lower levels of task cohesion were reported when an adaptation trigger occurred (M = 3.43, SD = .83) than when an adaptation trigger did not occur (M = 3.77, SD = .71), t (115) = 2.39, p = .02. Thus *H2a)* was supported.

H2b) proposed *"social cohesion is likely to be lower when an adaptation trigger occurs than when an adaptation trigger does not occur."* An independent-samples t-test was conducted to compare social cohesion when an adaptation trigger occurred and when an adaptation did not occur. Significantly lower levels of social cohesion were reported when an adaptation trigger occurred (M = 2.98, SD = .82) than when an adaptation trigger did not occur (M = 3.48, SD = .86), t (115) = 3.21, p < .001. As such, *H2b)* was supported.

H3) Two separate two-way ANOVA were conducted that examined the interaction effect between type of training (joint and separate) and the occurrence of an adaptation

trigger on task cohesion (*H3a*), and on social cohesion (*H3b*). In both cases the interaction effect was not statistically significant. For *H3a)*, $F(1, 113) = .47$, $p = .5$. For *H3b)*, $F(1, 113) = .02$, $p = .88$. Thus hypotheses *H3a)* and *H3b)* were not supported.

Discussion of these results will be elaborated upon in the following section.

Discussion

Discussion of results

The main objective of the present study was to deepen the cohesion literature within multiteam systems. In order to do so, this objective was divided into three main goals. First, to observe how a multiteam's cohesion varied with type of training. Second, to see if an MTS's cohesion varied with the occurrence of an adaptation trigger. Finally, it examined if MTS cohesion levels differed when an adaptation trigger occurred in teams who had trained together and in teams who had trained separately. In order to explore these objectives, an experimental design was created. By manipulating conditions within the experiment, I was able to analyze and compare means between groups. Results indicated that task cohesion levels were significantly higher for teams who had trained together than for teams who trained separately. However, the same was not found for social cohesion. It was also found that in the presence of a stress-inducing trigger, social and task cohesion levels were lower than in the absence of said trigger. Also, social and task cohesion levels did not vary significantly for teams who had trained together over teams who had trained separately, in the presence of a stress-inducing trigger. These results will now be further explored.

In accordance with the existing literature, it was expected that joint training would result in higher levels of both social and task cohesion when compared to separate training. However, results do not fully corroborate this expectation. Although both types of cohesion reported higher mean levels for joint training than separate training, mean difference was only significant for task cohesion. As such, support was found for higher task cohesion in teams who trained together than in teams who trained separately (*H1a*). This finding is relevant because of the benefits higher task cohesion can have on teams (e.g. improve team decision-making under temporal stress) (Zaccaro, Gualtieri, & Minionis, 1995). In a study conducted by Zaccaro and colleagues (1995), teams with a higher task cohesion devoted more time to planning and exchanging information during the planning period of the experiment, as well as communicating task-relevant information more frequently during performance than did teams with lower task-cohesion levels. Because an MTS must sometimes operate in adverse conditions where task cohesion plays an important role, it is advisable that teams train together.

Although support was not found for higher social cohesion in teams who trained together over teams who trained separately (*H1b*), these results provide partial support to the notion that joint training between MTSs' component teams increases their cohesiveness,

more so than separate training. The absence of significant mean difference in social cohesion levels between types of training (*H1b*) came as somewhat of a surprise. However, in some cases, MTS training tends to focus more on developing task-related skills and less on strengthening members' bonds (e.g., some types of astronaut training; Landon, Vessey, & Barrett, 2016). This might imply that even when teams train together that social cohesion does not increase significantly. It is possible that the lack of focus on social aspects during training could account for the absence of significant mean difference in social cohesion levels between MTSs who trained together and separately.

It was expected that task (*H2a*) and social (*H2b*) cohesion would be lower when an adaptation trigger occurred than when an adaptation trigger did not occur. Both hypotheses found support. Clearly, an acute stress-inducing trigger negatively affects cohesion levels, be it of a social or task nature. Chandler (2010) states that one of the goals for teamwork during crises is "to achieve the optimal level of interaction so that the team sustains its cohesion and coordination" (p.62). However, high levels of stress, time pressures, and the urgency for a solution to problems makes crisis conducive to groupthink. Groupthink makes members feel the need to get along with one another and reach consensus, thereby accepting proposals more easily because they don't want to challenge the prevailing opinion (Chandler, 2010). Because of groupthink, a team might overlook important pieces of information while making decisions (Dzindolet, Pierce, & Dixon, 2008). So, on the one hand, a team must challenge different points of view, critically assess proposed decisions and maintain a healthy sensibility about the limitations of the team itself. On the other hand, increased groupthink might limit a team's interaction and healthy disagreements, possibly affecting negatively on social cohesion. Lower task cohesion levels could be due to the fact that stress narrows a team's perspective (Dzindolet, et al., 2008). Driskell, Salas and Johnston (1999) found that while under stress, team members were more likely to shift from a team-level to an individual level task perspective, which resulted in degraded team performance.

These results are relevant for teams who will perform in high stress environments, where cohesion plays an important role for team outcomes. As has been mentioned, some authors believe that MTS component teams should be trained in cohesion-building skills (e.g., Noe et al., 2011). Although it is still early to say, perhaps their training should also include anticipation of diminished cohesion levels when the team faces unexpected situations and is put under stress. At the same time, the lack of realistic conditions under which teams train (Dzindolet, et al., 2008; Staal et al., 2008) needs to be attended. Teams need realistic training conditions in order to be adequately prepared for the challenges they are to face.

Finally, it was expected that MTS cohesion levels, in the presence of an adaptation trigger, would be higher for teams who had trained together than for teams who had trained separately (*H3)*. However, no support was found for either task (*H3a)* or social cohesion (*H3b)*. The absence of significant mean difference between types of training for social cohesion was unexpected because "individuals are better equipped to cope with stress if they have support from other team members who shared the experience, and if they have been trained together" (Flin et al., 2008, p. 175). Although this is specific for members within a team, it stands to reason that it could be applicable to multiple teams facing the same situation.

One cannot assume, however, that there is an absence of effect of type of team training on cohesion levels when an adaptation trigger occurs. It might imply that, in the presence of an adaptation trigger, the type of training may have little effect on cohesion levels. Understanding which of these two variables - type of training and occurrence of adaptation triggers - is more predictive of cohesion levels would allow teams, and MTS, to prepare for high stress situations.

Limitations

After analyzing this study's results it also important to consider its limitations. To begin with, it is difficult to extrapolate these findings from a fictitious scenario to a real-world context. As such, other studies – in laboratory settings and real-world context – should be conducted. The design of the experiment, namely its level of analysis, should also be considered. Gully (2000) stated that when conducting research on work teams in an organizational context, one must treat the team "as the primary level of analysis" (p.32). This was attempted in the present study by assigning all individuals to the same team. Thus, one could interpret that the combined average of responses is the team's perception. Also, one could argue that by framing questions which made respondents consider both teams (Alpha and Beta) simultaneously, that this would leads respondents to only think at a "team level," and not so much at an individual level.

Following the line of thought within the "level of analysis" argument, some researchers have stated that when studying cohesion, one should avoid individual-level studies because cohesion is a group phenomenon (Beal et al., 2003; Careless & De Paola, 2000; Carron & Brawley, 2012; Chiocchio & Essiembre, 2009). As such, analyzing team cohesion scores at the individual level may lead to misspecification (Vanhoe & Herian,

2015). It is not known how this might have affected the present investigation. A follow-up study could address this issue by assigning participants to different teams and later by aggregating participants' perceptions of cohesion to a team-level (see DiRosa et al., 2015).

Another limitation that could be pointed out is that time was not fully considered when measuring cohesion. According to Mathieu and colleagues (2015), scholars have pointed out the need for a greater appreciation of the role of time in the study of team dynamics in general (e.g., Kozlowski & Ilgen, 2006) and cohesion in particular. As stressed by Carron and Brawley (2000), various dimensions of cohesion are not always present or equally salient throughout the life of a group. Cohesion takes time before team members become acquainted and develop some kind of attraction (Chiocchio & Essiembre, 2009). According to Chiocchio and Essiembre (2009) there should be a "minimum of four weeks of team interactions (…) for teams in academic as well as organizational settings to reach a certain degree of acquaintance and culminate group experiences underlying cohesion factors" (p. 389). Although it was stated that teams had spent time training together, this might not have reverberated fully with the respondents. Also, because respondents were asked to picture a fictitious scenario, they did not develop cohesion with other respondents, even for the duration of the experiment, which might alter their perception of cohesion, and consequently their responses.

Another limitation may derive from the adaptation of the TC scale into Portuguese. For example, Costa (2014) did not apply the translated items in the scale to bilingual subjects, and there was no confirmatory factor analysis conducted (van de Vijver & Hambleton, 1996). By not following all the steps necessary to translate an instrument, there may be item bias (van de Vijver & Hambleton, 1996). It is unsure how this might have had an impact on results. Finally, it should be pointed out that the adapted Portuguese TC scale was never tested on real teams, only in hypothetical scenarios (e.g. Costa, 2014).

Future directions

Maynard and Kennedy (2016) pointed out the need to further examine the relationship between adaptation and cohesion within teams. Future investigations should seek to examine empirically whether team cohesion is an input as well as an output of the team adaptation processes, as has been theorized by Maynard, Kennedy, Sommer and Passos (2015). At the same time, studies should aim to understand which levels of cohesion are more adaptive for a team. Differences in social and task cohesion levels might have different effects on adaptation outcomes. At the same time, while it has been shown that there are benefits from

high cohesion levels, future studies should study what are optimal cohesion levels. Too little cohesion is detrimental to a team's functioning, but at the same time very high levels could actually deter performance, rather that enhance it (DiRosa et al., 2015). For example, Kizzia (2015) put forward the example that in space "a team with too much cohesion might be prone to ignoring orders". As such, training MTS needs to be strategic in where to foster cohesive ties and the extent to which those ties are strengthened (DiRosa et al., 2015).

Another avenue of investigation could relate to training, namely trying to understand what the best type of training for MTSs is. According to Mathieu (2012), initial research has shown that the training and development of MTS members can be beneficial both in terms of enhancing component team performance as well as system performance. However, there is need for a better understanding of how to select, train, and develop MTSs (Mathieu, 2012). Maynard and Kennedy (2016) pointed out, for example, that it might appear that joint team training would be beneficial, but that insofar it was difficult to ascertain whether such training programs actually enhanced the levels of adaptability possessed by such teams. Maynard and Kennedy (2016) comment that:

> Understanding how long such training effects are likely to last within a team thus impacts the decision regarding whether, how much, and what types of training the team will need (…) to reinforce the lessons previously learned prior to the mission (p.40).

There is then an appeal for future investigations to research the effects of type of training on adaptability in real teams. These investigations should also explore the effects on cohesion. Even if team cohesion levels lower in the face of traumatic situations - as was demonstrated in the present study - team cohesion has been shown to mitigate acute stress reactions in team members (Carr, 2010). It is thus important to train MTS teams in order for them to have the adequate cohesion levels necessary to deal with traumatic situations.

References

Alliger, G. M., Cerasoli, C. P., Tannenbaum, S. I., & Vessey, W. B. (2015). Team resilience: How teams flourish under pressure. *Organizational Dynamics*, *44* (3), 176-184.

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.

Berg, J. S., Grieger, T. A., & Spira, J. L. (2005). Psychiatric symptoms and cognitive appraisal following the near sinking of a research submarine. *Military medicine*, *170*(1), 44-47.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin*, *86*(2), 307-324.

Burke, C. S., Stagl, K. C., Salas, E., Pierce, L., & Kendall, D. L. (2006). Understanding team adaptation: A conceptual analysis and model. *Journal of Applied Psychology, 91*(6), 1189-1207.

Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E. & Volpe, C. E. (1995), Defining team competencies: Implications for training requirements and strategies. In R. Guzzo & E. Salas (Eds), *Team effectiveness and decision making in organizations* (pp.83-87). 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.

Carr, K. F. (2010). A community based approach to coping with crises in Africa. In P. Dass-Brailsford (Ed.) *Crisis and disaster counseling: Lessons learned from hurricane Katrina and other disasters* (pp.197-212). Sage Publications.

Carron, A. V., & Brawley, L. R. (2000). Cohesion: Conceptual and measurement issues. *Small Group Research, 31*(1), 89-106. doi: 10.1177/104649640003100105.

Carron, A. V., & Brawleys, L. R. (2012). Cohesion: Conceptual and measurement issues. *Small Group Research, 43*(6) 726–743. doi: 10.1177/1046496412468072.

Carron, A. V., Brawley, L. R., & Widmeyer, W. N. (1997). The measurement of cohesiveness in sport groups. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement.* Morgantown, WV: Fitness Information Technology.

Carron, A. V., & Spink, K. S. (1993). Team building in an exercise setting. *Sport Psychologist*, *7*(1), 8-18.

Carron, A. V., Widmeyer, W. N., & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sport teams: The group environment questionnaire. *Journal of Sport Psychology*, *7*(3), 244-266.

Casey-Campbell, M., & Martens, M. L. (2009). Sticking it all together: A critical assessment of the group cohesion-performance literature. *International Journal of Management Reviews*, *11*(2), 223-246.

Chandler, R. C. (2010). *Emergency notification*. Santa Barbara, CA: Greenwood Publishing

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.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of management*, *23*(3), 239-290.

Connaughton, S. L., Williams, E. A., & Shuffler, M. L. (2012). Social identity issues in multiteam systems considerations for future research. In S. J. Zaccaro, M. A. Marks, L. A. DeChurch (Eds.), Multiteam systems: *An organization form for dynamic and complex environments* (pp.109-139). Routledge.

Costa, B. (2014). O impacto do treino conjunto e da familiaridade nas percepções de coesão de equipas de missão (Dissertação de Mestrado, Universidade de Lisboa). Acedido em http://repositorio.ul.pt/handle/10451/15349.

Craig, T. Y., & Kelly, J. R. (1999). Group cohesiveness and creative performance. *Group dynamics: Theory, research, and practice*, *3*(4), 243-256.

David, E. M., & Keeton, K. (2011, April). Staying alive! Training high-risk teams for self correction. In E. David (Co-Chair), & K. Keeton (Co-Chair), *Staying Alive! Training High-Risk Teams for Self Correction*. Symposium conducted in Chicago, IL. Retrieved from http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20110011555.pdf. Accessed on June 20th, 2016.

DeChurch, L. A., & Mathieu, J. E. (2009). Thinking in terms of multiteam systems. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations*: *Cross-disciplinary perspectives and approaches* (pp.267-292). Psychology Press.

Deeter-Schmelz, D. R., & Kennedy, K. N. (2003). Patient care teams and customer satisfaction: The role of team cohesion. *Journal of Services Marketing*, *17*(7), 666-684.

Dion, K. L. (2000). Group cohesion: From" field of forces" to multidimensional construct. *Group Dynamics: Theory, Research, and Practice*, *4*(1), 7.

DiRosa, G. A. (2009). *Emergent Phenomena in Multiteam Systems: An Examination of Between-Team Cohesion* (Doctoral dissertation, George Mason University). Retrieved from http://digilib.gmu.edu/xmlui/bitstream/handle/1920/8239/DiRosa_gmu_0883E_10345.pdf?sequence=1.

DiRosa, G. A., Estrada, A. X., & DeCostanza, A. H. (2015). Cohesion with large collectives: A multiteam systems perspective. In E. Salas, A. X. Estrada, & W. B. Vessey (Eds.), *Team cohesion: Advances in psychological theory, methods and practice* (pp.25-52). Emerald Group Publishing.

Driskell, J. E., Salas, E., & Johnston, J. (1999). Does stress lead to a loss of team perspective? *Group Dynamics: Theory*, *Research and Practice*, *3*(4), 1-12.

Driskell, J. E., Salas, E., & Johnston, J. (2001). Stress management: Individual and team training. In E. Salas, C. A. Bowers, E. Edens (Eds.), *Improving teamwork in organizations: Applications of resource management training* (pp.55-72). CRC Press.

Driskell, J. E., Salas, E., & Johnston, J. H. (2006). Decision making and performance under stress. In T. W. Britt, C. A. Castro, & A. Adler (Eds.), *Military life: The psychology of serving in peace and combat* (pp.128-154). Greenwood Publishing.

Driskell, J. E., Salas, E., Johnston, J. H., & Wollert, T. N. (2008). Stress exposure training: An event-based approach. In P. A. Hancock & J. L. Szalma (Eds.), *Performance under stress* (pp. 271-286). Ashgate Publishing.

Dzindolet, M. T., Pierce, L. G., & Dixon, M. W. (2008). Augmenting multi-cultural collaboration. In P. A. Hancock & J. L. Szalma (Eds.), *Performance under stress* (pp.287-322). Ashgate Publishing.

Festinger, L., Schacter, S., & Back, K. (1950). *Social pressures in informal group: A study of human factors in housing*. Stanford, CA: Stanford University Press.

Firth, B. M., Hollenbeck, J. R., Miles, J. E., Ilgen, D. R., & Barnes, C. M. (2015). Same page, different books: Extending representational gaps theory to enhance performance in multiteam systems. *Academy of Management Journal, 58*(3), 813-835.

Flin, R., O'Connor, P., & Crichton, M. (2008). *Saftey at the sharp end: A guide to non-technical skills*. Ashgate Publishing.

Gallander Wintre, M., North, C., & Sugar, L. A. (2001). Psychologists' response to criticisms about research based on undergraduate participants: A developmental perspective. *Canadian Psychology/Psychologie Canadienne*, *42*(3), 216.

Goldstein, I. L., & Ford, J. K. (2002). *Training in organizations: Needs assessment, development, and evaluation*. Belmont, CA: Wadsworth.

Greer, L. L. (2012). Group cohesion then and now. *Small Group Research*, *43*(6), 655–661.

Goodman, P. S., Ravlin, E. C., & Schminke, M. (1987). Understanding groups in organizations. *Research in Organizational Behavior, 9*, 121-173.

Grossman, R. (2014). *How do teams become cohesive? A meta-analysis of cohesion's antecedents* (Doctoral dissertation, University of Central Florida). Retrieved from http://etd.fcla.edu/CF/CFE0005499/Grossman_2014_How_do_teams_become_cohesive_A_meta_analysis_of_cohesions_antecedents.pdf.

Grossman, R., Rosch, Z., Mazer, D., & Salas, E. (2015). What matters for team cohesion measurement? A synthesis. *Research on Managing Groups and Teams*, *17*, 147-180.

Gully, S. (2000). Work teams research. In M. M. Beyerlin (Ed.), *Work teams: Past, present and future* (pp. 25-44). Springer Netherlands. doi: 10.1007/978-94-015-9492-9_2.

Gully, S. M., Devine, D. J., & Whitney, D. J. (1995). A meta-analysis of cohesion and performance effects of level of analysis and task interdependence. *Small Group Research*, *26*(4), 497-520.

Hancock, P. A., Harris, W. C., & Harris, S. C. (2001, October). Information processing changes following extended stress. In *Proceedings of the Human Factors and Ergonomics Society*, *45*(13), 901-905. SAGE Publications

Hinsz, V. B., & Betts, K. R. (2012). Conflict in multiteam situations. In S. J. Zaccaro, M. A. Marks, L. A. DeChurch (Eds.), Multiteam systems: *An organization form for dynamic and complex environments* (pp.289-322). Routledge.

Hirschfeld, R. R., Jordan, M. H., Field, H. S., Giles, W. F., & Armenakis, A. A. (2005). Team's female representation and perceived potency as inputs to team outcomes in a predominantly male field setting. *Personnel Psychology, 58*, 893_924. doi:10.1111/ j.1744-6570.2005.00892.x.

Hollenbeck, J. R., DeRue, D. S., & Guzzo R. (2004). Bridging the gap between I/O research and HR practice: Improving team composition, team training and team task design. *Human Resource Management, 43*(4), 353–366.

Hornsey, M. J. (2008). Social identity theory and self‐categorization theory: A historical review. *Social and Personality Psychology Compass*, *2*(1), 204-222.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From input-process-output models to IMOI models. *Annual Review of Psychology*, *56*, 517-543.

Kanas, N., & Manzey, D. (2003). *Space psychology and psychiatry*. El Segundo, CA: Microcosm Press.

Kanas, N., Sandal, G., Boyd, J. E., Gushin, V. I., Manzey, D., North, R., ... & Inoue, N. (2009). Psychology and culture during long-duration space missions. *Acta Astronautica*, *64*(7), 659-677.

Kirschenbaum, S. S. (2011). Expertise in the submarine domain: The impact of explicit display on the interpretation of uncertainty. In K. L. Mosier, & U. M. Fischer (Eds.), *Informed by knowledge: Expert performance in complex situations* (pp.189-199). Psychology Press.

Kizzia, T. (2015). Moving to Mars: Preparing for the longest, loneliest voyage ever. *The New Yorker*. Retrieved from http://www.newyorker.com/magazine/2015/04/20/moving-to-mars. Accessed on September 20, 2016.

Kozlowski, S. W., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology (Vol. 12): Industrial and Organizational Psychology* (pp. 333-375). New York: Wiley.

Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological science in the public interest*, *7*(3), 77-124.

Kozlowski, S. W., Watola, D. J., Jensen, J. M., Kim, B. H., & Botero, I. C. (2009). Developing adaptive teams: A theory of dynamic team leadership. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (pp.113-155). Psychology Press.

Landon, L. B., Vessey, W. B., & Barrett, J. D. (2016, April). *Evidence report: Risk of performance and behavioral health decrements due to inadequate cooperation, coordination, communication, and psychosocial adaptation within a team.* Houston, Tx: National Aeronautics and Space Administration.

MacCoun, R. J. (1996). Sexual orientation and military cohesion: A critical review of the evidence. In G. M. Herek, J. B. Jobe, & R. M. Carney (Eds.), *Out in force: Sexual orientation and the military* (pp.157-167). Chicago: University of Chicago Press.

Marks, M. A., DeChurch, L. A., Mathieu, J. E., Panzer, F. J., & Alonso, A. A. (2005). Teamwork in multiteam systems. *Journal of Applied Psychology*, *90*(5), 964-971.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, *26*(3), 356–376.

Mathieu, J. E. (2012). Reflection on the evolution of the multiteam systems concept and a look to the future. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam*

systems: An organization form for dynamic and complex environments (pp. 511-538). New York: Taylor & Francis Group.

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.

Mathieu, J. E., Marks, M. A., & Zaccaro, S. J. (2001). Multiteam systems. In N. Anderson, D. S. Ones, H. K. Sinangil, & C. Viswesvaran (Eds.). *International handbook of work and organizational psychology* (pp. 289-313). London: Sage.

Mathieu, J. E., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-20007: A review of recent advancements and a glimpse into the future. *Journal of Management*, *34*(3), 410-476.

Maynard, M. T., & Kennedy, D. M. (2016, January). *Team adaptation and resilience: What do we know and what can be applied to long-duration isolated, confined, and extreme contexts.* Houston, Tx: National Aeronautics and Space Administration.

Maynard, M. T., Kennedy, D. M., & Sommer, S. A. (2015). Team adaptation: A fifteen-year synthesis (1998-2013) and framework for how this literature needs to "adapt" going forward. *European Journal of Work and Organizational Psychology*, *24*(5), 652-677.

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. *Research on Managing Groups and Teams*, *17*, 83-111.

McGrath, J. E. (1964). *Social psychology: A brief introduction*. New York: Holt, Rinehart and Winston.

McLeod, J., & von Treuer, K. (2013). Towards a cohesive theory of cohesion. *International Journal of Business and Social Research*, *3*(12), 1-11.

Orasanu, J., & Baker, P. (1996). Stress and military performance. In J. Driskell & E. Salas (Eds.), *Performance under stress* (pp. 89-117). Hillsdale, NJ: Lawrence Erlbaum Assocaites.

Orasanu, J., & Lieberman, P. (2011). NDM issues in extreme environments. In K. L. Mosier, & U. M. Fischer (Eds.), *Informed by knowledge: Expert performance in complex situations* (pp.3-21). Psychology Press.

Otten, S., & Moskowitz, G. B. (2000). Evidence for implicit evaluative in-group bias: Affect-biased spontaneous trait inference in a minimal group paradigm. *Journal of Experimental Social Psychology*, *36*(1), 77-89.

Pleil, J. D., & Hansel, A. (2012). Submarines, spacecraft and exhaled breath. *Journal of Breath Research*, *6*(1), 1-3. doi: 10.1088/1752-7155/6/1/019001.

Resick, C. J., Burke, C. S., & Doty, D. (2012). Multiteam system (MTS) research in laboratory settings: A look at the technical and practical challenges. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments* (pp.487-510). New York: Taylor & Francis Group.

Salas, E., DiazGranados, D., Klein, C., Burke, C. S., Stagl, K. C., Goodwin, G. F., & Halpin, S. M. (2008). Does team training improve team performance? A meta-analysis. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *50*(6), 903-933.

Salas, E., & Cannon-Bowers, J. A. (1997). Methods, tools, and strategies for team training. In, M. A. Quiñones, & A. E. Ehrenstein (Eds.), *Training for a rapidly changing workplace: Applications of psychological research* (pp.249-280). Washington, DC: American Psychological Association.

Salas, E., Rosen, M. A., Burke, C. S., & Goodwin, G. F. (2009). The wisdom of collectives in organizations: An update of the teamwork competencies. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and approaches* (pp.39-79). Psychology Press.

Serfaty, D., Entin, E., Johnston, J. (1998). Team coordination training. In J. A. Cannon-Bowers, E. Salas (Eds.) *Making decisions under stress* (pp.221-245). Washington, D.C.: American Psychological Association.

Shuffler, M. L., Jiménez-Rodríguez, M., & Kramer, W. S. (2015). The science of multiteam systems: A review and future research agenda. *Small Group Research*, *46*(6), 659–699.

Shuffler, M. L., Rico, R., & Salas, E (2014). Pushing the boundaries of multiteam systems in research and practice: an introduction. In M. L. Shuffler, R. Rico, & E. Salas (Eds.), *Pushing the boundaries: Multiteam systems in research and practice* (pp.3-16). Emerald Group Publishing.

Staal, M. A., Bolton, A. E., Yaroush, R. A., & Bourne Jr., L. E. (2008). Cognitive performance and resilience to stress. *In* B. J. Luckey & V. Tepe (Eds.), *Biobehavioral resilience to stress*. Boca Raton, FL: CRC Press.

Stachowski, A. A., Kaplan, S. A., & Waller, M. J. (2009). The benefits of flexible team interaction during crises. *Journal of Applied Psychology*, *94*(6), 1536-1543.

Tajfel, H. E. (1978). *Differentiation between social groups: Studies in the social psychology of intergroup relations*. Academic Press.

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behavior. *European Journal of Social Psychology*, *1*(2), 149–178.

Turner, J. C., & Tajfel, H. (1986). The social identity theory of intergroup behavior. *Psychology of intergroup relations*, 7-24.

van de Vijver, F. J. R., & Hambleton, R. K. (1996). Translating tests: Some practical *guidelines. European Psychologist*, *1*(2), 89-99.

van Leeuwen, E., van Knippenberg, D., & Ellemers, N. (2003). Continuing and changing group identities: The effects of merging on social identification and ingroup bias. *Personality and social psychology bulletin*, *29*(6), 679-690.

Vanhoe, A. J. & Herian, M. N. (2015). Team cohesion and well-being: a relational model. In E. Salas, W. B. Vessey, & A. X. Estrada (Eds.), *Team cohesion: Advances in psychological theory, methods and* practice (pp.53-82). Emerald Group Publishing.

Vessey, W. B. (2014). Multiteam systems in the spaceflight context: current and future challenges. In M. L. Shuffler, R. Rico, & E. Salas (Eds.), *Pushing the boundaries: Multiteam systems in research and practice* (pp.135-155). Emerald Group Publishing.

West, M. A. (2012). Effective teamwork: Practical lessons from organizational research (3rd Ed.). John Wiley & Sons.

Widmeyer,W. N., Brawley, L. R., & Carron, A. V. (1985). *The measurement of cohesion in sports teams: The group environment questionnaire*. London, Ontario: Sports Dynamics.

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

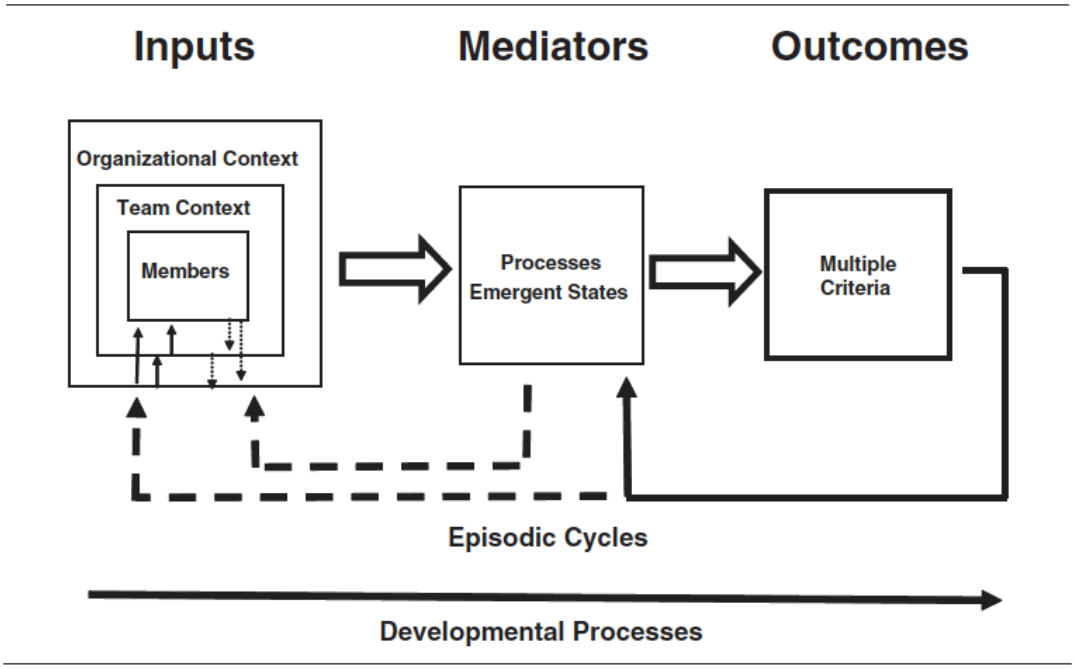
Zaccaro, S. J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of team decision making under temporal urgency. *Military Psychology*, *7*(2), 77-93.

Zaccaro, S. J., Marks, M. A., & DeChurch, L. A. (2012). Multiteam systems: An introduction. *In* S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam systems: An organization form for dynamic and complex environments* (pp.3-32). New York: Taylor & Francis Group.

Appendices

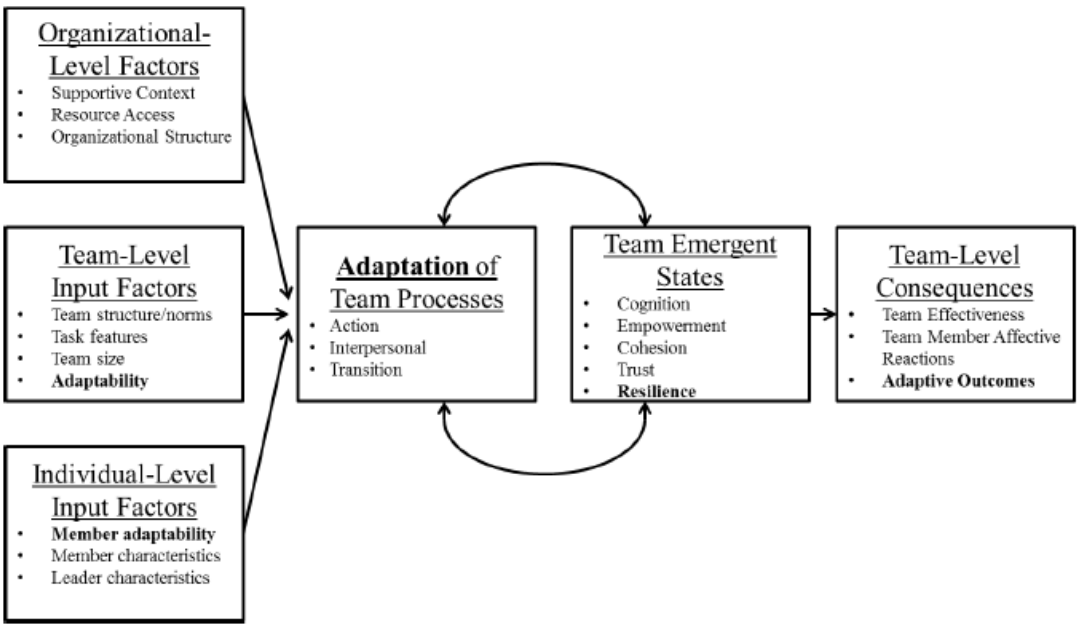
Appendix A

Input-Mediator-Outcome (IMO) Team Effectiveness Framework. *In* Mathieu, Maynard, Rapp, & Gilson (2008), p. 413.



Appendix B

Team Adaptation Nomological Network. *In* Maynard & Kennedy, 2016, p. 64.



Appendix C

Team Adaptation Nomological Network Including Consideration of Factors that may Enhance/Hinder the Team Adaptation-Team Cohesion Reciprocal Relationship. *In* Maynard, Kennedy, Sommer, & Passos, 2015, p. 92.