

Oțoiu, Cătălina; Rațiu, Lucia; Rus, Claudia Lenuța

## Article

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Article

# Rivals When We Work Together: Team Rivalry Effects on Performance in Collaborative Learning Groups

Cătălina Oțoiu \*, Lucia Rațiu and Claudia Lenuța Rus

Department of Psychology, Babeș-Bolyai University, 400084 Cluj-Napoca, Romania

\* Correspondence: catalinaotoiu@psychology.ro

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**Abstract:** Team rivalry has been mostly studied in competition settings, between competing individuals or teams, and has been linked to positive performance outcomes due to its impact on increasing motivation. However, rivalry is not limited to such contexts, it can also occur in collaborative settings, among team members working on a collaborative task. We argue that in such settings rivalry in teams has a negative impact on team performance, due to its negative impact on team learning behaviors. We employed a time-lagged, survey-based design with a sample of 176 students (55 teams) to investigate the relationship between rivalry and team performance through team learning behaviors. Our results based on simple mediation analyses show that, for our sample, rivalry in teams was not in fact negatively correlated to learning behaviors. Furthermore, we did not find support for the hypothesized positive relationship between learning behaviors and team performance, nor for the partial mediation model we proposed. We show how a series of team and task characteristics could explain our results and discuss potential future directions in the study of rivalry in collaborative settings.

**Keywords:** team rivalry; collaborative learning; team learning behaviors; team performance

## 1. Introduction

Does rivalry foster collaborative dynamic capabilities and performance within a team? Rivalry has received a significant amount of attention in the literature, due to its pairing with competition and its pervasive nature across domains and fields of research and practice. Because of this pairing, previous inquiries of rivalry are typically anchored in studies on competition or competitive situations (Converse and Reinhard 2016; Kilduff et al. 2010; Zucchini et al. 2018; Yip et al. 2018). To our knowledge, there is little evidence in the literature that specifically focuses on rivalry as an antecedent to team performance within collaborative settings. The present study is trying to address this gap by looking into what happens when rivalry is present within groups that work on collaborative tasks. Building upon the literature on team relational losses, we argue that rivalry acts as a proxy to negative relations in teams and has a similar negative effect on team performance through a series of mediating mechanisms.

Researching rivalry in this setting could shed light on the relational dynamics between team members and the potential negative effect of rivalry on individual and team performance. Results could yield significant implications for team dynamics and optimizing collaborative learning by overcoming detrimental rivalries.

The present paper is structured as follows. We first discuss the main findings on rivalry and its linkages to team performance. We then introduce the concepts of collaborative learning and team learning behaviors and their role in obtaining team performance. Finally, we show the potential negative influences that rivalry has on team performance and propose this relationship is mediated by team learning behaviors.

### 1.1. Rivalry in Teams

Rivalry is ubiquitous in any team and organization, occurring mainly when resources are of limited availability (Kistruck et al. 2016). Team members compete for resources (e.g., in business for bonuses, promotions, prestige) constantly, and these constant competitive inter- and intra-team interactions are likely to generate rivalries. The psychological phenomenon of rivalry originates in sports competition, being embedded in the relational nature of competition, and largely studied among professional sports teams (Kilduff et al. 2010).

While focusing on the competing athletes, Kilduff et al. (2010) conceptualized rivalry as “a subjective competitive relationship that a focal actor has with another actor which increases the focal actor’s psychological involvement and stakes of competition independent of the objective characteristics of the situation” (p. 945). This definition captures the intense competitive nature of the relationship that exists between two or more specific opponents and conceptualizes prior competition between actors as an antecedent of rivalry.

In the extant rivalry literature, besides competition, two other antecedents of rivalry were mentioned, namely similarity and evenly matched contests; although the model of antecedents is not fully empirically supported in previous research (Converse and Reinhard 2016; Kilduff 2014; Kilduff et al. 2010). Similarity between individuals fosters not only attraction and cooperation (e.g., McPherson et al. 2001), but, at some point, greater rivalry. According to research in organizations, envy and rivalry arises when employees compare themselves with their peers and coworkers and subsequently feel a threat to their own status (Cohen-Charash 2009; Duffy and Shaw 2000). Any kind of similarity may trigger social comparison and thus potential conflict in the work context (Festinger 1954). However, some kinds of similarity are stronger triggers than others, depending on how much those attributes are career-related (Pelled et al. 1999). The career-relatedness of an attribute denotes the degree to which that attribute is valued in formal and informal assessments of career development and progress. Similarity of status with respect to highly career-related attributes is, therefore, particularly likely to engender rivalry by amplifying pressures towards social comparison and heightening the relevance of the competition to the social identities of the individuals (e.g., Festinger 1954; Greve 2008). Thus, competition against similar others could, in turn, increase the psychological stakes of competition and hence rivalry (Kilduff et al. 2010).

Another antecedent of rivalry is evenly matched contests (Kilduff et al. 2010). Narrowly decided competitions (close calls) promote greater counterfactual thinking, rumination, and emotional reactions (e.g., Kahneman and Miller 1986) and consequently increase feelings of rivalry.

In terms of its behavioral consequences, research on rivalry has a shared history with research on intra-team conflict by suggesting the positive relationship with motivation and effort within a team (Kilduff 2014; Kilduff et al. 2010; Ku et al. 2005; Malhotra 2010). Rivalry brings more energy and activates greater effort when competing against rivals (Kilduff 2014; Kilduff et al. 2010); additionally, actors are more action-orientated (Converse and Reinhard 2016). The consequences of rivalry are studied mostly in competition contexts and seem to be rather favorable to individual and team performance. Prior research showed that adding rivalry to competition increased intentions to pursue a personal goal increased motivation to exert greater effort and to accomplish an effort-based sport activity (Converse and Reinhard 2016; Kilduff 2014).

Beyond the activating effect rivalry brings into the team, a dark side of rivalry might emerge as well. Recent research findings suggest that adding rivalry to a competition also increased spontaneous responding and a propensity to skip preparation opportunities (Converse and Reinhard 2016). For instance, a study on sports teams (e.g., intra-team), found that rivalry led to decreased effort and performance of team members (Newton et al. 2000). Other empirical work suggested that the experience of rivalry promoted unethical behavior in both laboratory and field settings, such as soccer games (Kistruck et al. 2016). A laboratory study pointed out that trash-talking can trigger perceptions of rivalry and motivate destructive and unethical behavior hindering creative performance (Yip et al. 2018). Behavioral dynamics that characterize rivalry such as the devaluation of others, striving for

supremacy, and aggressive reactions should be most detrimental in the context of close intra-team relationships that necessitate mutual respect, equality, and warmth (Back et al. 2013).

In summary, as rivalries develop between team members, motivation and performances increase at the individual and team levels, but caution should be used when deviance occurs and impede the professional work environment. Rivalry shapes team behaviors and those team behaviors, in turn, shape team performance, but these linkages lack empirical research and need further investigation.

In the present study, we focused on the potential dark side of rivalry within a team, looking at the relationships with team learning and team output. To our knowledge, only anecdotal evidence reports on a positive impact of team rivalry on team members' learning processes (Lotz 2010). However, looking into the literature on intra-team relational conflict as a proxy for studying team rivalry, we expect that team rivalry has a similar negative impact on group cohesion, commitment, satisfaction, and performance (De Dreu and Weingart 2003; Jehn and Mannix 2001). Efforts that depend on collaboration may start out with much enthusiasm, but gradually develop less helpful features including competition and rivalry between different members (Lowndes and Skelcher 1998).

### 1.2. Collaborative Learning and Team Learning Behaviors

Team learning has been included in most team effectiveness and performance frameworks (Mathieu et al. 2017) and its positive impact on team performance has been extensively discussed with relation to both capacities. Within the Input-Mediator-Output framework on team effectiveness developed by Mathieu and his colleagues setting, team learning behaviors are conceptualized as mediating mechanisms in relation to team effectiveness (Mathieu et al. 2019).

Considering this framing, we take on the perspective of teams conceptualized as information processing systems (De Dreu et al. 2008). From this standpoint, team learning has been studied both as an outcome, a change in the team's collective level of knowledge and skill derived from team members' interaction (Ellis et al. 2003), and as a process where the team goes through activities that foster knowledge sharing and processing (Gibson and Vermeulen 2003).

Somewhat included in the larger team learning literature, collaborative learning refers to learning and knowledge construction through interaction and collaborative processes, and it includes the mutual engagement of team members in joint effort to construct knowledge together (Vuopala et al. 2015). This mutual engagement and co-construction of knowledge is specifically relevant to the conceptual framing of collaborative learning, as it distinguishes it from a close counterpart, namely cooperative learning. Both collaborative and cooperative learning involve team members working together to maximize their own and each other's learning outcome and they both recognize positive relationships and social support between group members as opposed to them being in a competitive setting (Vuopala et al. 2015). In their work on collaborative learning, Van den Van den Bossche et al. (2006) argue that construction, co-construction of knowledge and constructive task conflict are all part of team learning.

Since the focus in collaborative learning is on knowledge construction, information integration and processing are key factors in ensuring effective learning, and positive learning outcomes and team performance. This moves our discussion towards understanding knowledge emergence in teams and team processes and emergent states that affect knowledge emergence at team level. (Grand et al. 2016) propose a process-oriented theory of knowledge emergence where they emphasize aspects with regard to information processing within teams (i.e., sharing information, translating information in such a way that is understandable for others within the team) but also introduce the idea that team members may choose not to share information even when it is relevant for the task of the team. However, this idea is not new, and there is supporting evidence for informational losses in teams due to a variety of reasons (Schippers et al. 2014). We argue that rivalry may be a factor for informational losses, and therefore, directly affects the development of the emergent states and team processes.

### 1.3. Rivalry, Team Learning Behaviors, and Team Performance

In a recent conceptual study on team learning climate, Harvey et al. argue that, from a systems dynamics view, we should also look into delayed effects of team emergent states on team learning, and not just focus on the primary effects and relations that research has thus far uncovered (Harvey et al. 2019). In their research, the authors integrated four of the emergent states consistently linked to team learning, namely, psychological safety, goal orientation, efficacy, and cohesion, and they show how, when studied over time, the primary positive effects on team learning could lead to negative effects on the long run. For example, psychological safety promotes knowledge sharing because it fosters a safe environment where team members feel they can take interpersonal risks and express opinions knowing that they are not going to be judged (Edmondson 1999). Hence, knowledge sharing is increased and has a positive impact on team learning. However, Harvey et al. (2019) argue that while psychological safety may at first benefit team learning, a secondary effect may also emerge. Too much psychological safety could foster too much information sharing, hence creating a problem for information processing and encumbering knowledge transfer and integration; therefore, psychological safety could at some point be impeding team learning (Harvey et al. 2019). Similarly, they argue that cohesion has a positive impact on learning, but in time, cohesion may impede psychological safety, when team members become more concerned with maintaining a positive group climate, and hence refrain from making contributions and comments that would affect the individual positive relations within the team.

This, “too much of a good thing” effect is not new to the study of teams. Looking into the effects of communication on group cognitive complexity, Coman et al. demonstrate there is a non-linear relation between the two, with communication frequency having a positive impact on group cognitive complexity up to a point, and a negative impact once that frequency is increased (Coman et al. 2019).

Considering these findings, we believe there is sufficient evidence in the literature to support our claim that, while most studies focus on the benefits that rivalry has on team members’ motivation and team effort to perform on the team task, there may be a dark side to rivalry within teams, a secondary negative effect. There is almost no empirical evidence with regard to the negative effects of team rivalry on team performance, but this may be a result of the way in which team rivalry has been mostly researched within competition settings, mostly from literature on sports teams.

We know that rivalry has been associated with unethical behaviors, both in laboratory settings and in field studies of sports teams (Kistruck et al. 2016). Extrapolating these findings in the context of a complex cognitive task, we argue that unethical behavior in this context would consist in knowledge hiding (Connelly et al. 2012). Knowledge hiding “is not simply the absence or the opposite of sharing, but they are conceptually distinct constructs; rather, knowledge hiding is the intentional attempt to withhold or conceal knowledge that has been requested by another individual” (Connelly et al. 2012). As we have previously shown, team members’ willingness to share information is a key aspect of collective knowledge emergence and team learning (Grand et al. 2016). We believe that rivalry within collaborative tasks and contexts would enable knowledge hiding, and hence impede knowledge sharing, one of the key team learning behaviors.

Rivalry is conceptualized as a relational construct (Kilduff et al. 2010; Kilduff 2014) and considering its behavioral consequences (Kistruck et al. 2016; Yip et al. 2018), we argue that in collaborative team settings rivalry is included within the specter of negative relations within teams. Negative relations within the team have a damaging effect on performance, because they block communication, reduce interaction instances and create a dysfunctional team environment where team members obstruct each other’s task related efforts (de Jong et al. 2014). Emotional challenges and conflicts can impede collaborative learning, as they arouse negative emotions, frustration and even anger and move the focus of the group away from on-task activities (Ayoko et al. 2008).

Within the IMO framework of team effectiveness (Mathieu et al. 2019), for the purpose of this study we conceptualize rivalry as a team input and relate it to team compositional features. Therefore, we argue that existing rivalry amongst team members, stemming from prior interaction and social

comparison, has a negative effect on team performance because of the damaging effects it has on team learning behaviors in a complex collaborative team task. As such, we propose the following hypotheses.

**Hypothesis 1 (H1).** *Rivalry within the team is negatively related to team learning behaviors.*

**Hypothesis 2 (H2).** *Team learning behaviors are positively related to team performance.*

**Hypothesis 3 (H3).** *Team learning behaviors will partially mediate the negative relationship between team rivalry and team performance.*

## 2. Results

Means, standard deviations, and bivariate correlations for all variables, computed at team level, are included in Table 1.

**Table 1.** Means, standard deviations, and bivariate correlations between all the variables included in the study (N = 55).

	M	SD	1	2	3
1. Rivalry in team	1.12	0.24	(-)		
2. Team learning behaviors	4.09	0.69	-0.30 *	(0.87)	
3. Team performance	1.67	0.31	-0.03	0.48 **	(-)

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ;  $\alpha$  Cronbach reliability.

We found that a high level of the rivalry is associated with a low level of team learning behaviors ( $r = -0.30$ ,  $p < 0.05$ ). Surprisingly, rivalry in team was not significantly associated with team performance ( $r = -0.03$ ,  $p > 0.05$ ). Furthermore, the higher team learning behaviors of a team, the higher its levels of perceived team performance ( $r = 0.48$ ,  $p < 0.01$ ). Considering the existence of the correlation between rivalry and team learning behaviors, on the one hand, and the correlation between team learning behaviors and team performance, on the other hand, we proceeded to test the hypotheses of our study using IBM SPSS v.24 and the macro PROCESS v3 (Hayes 2018).

Hypothesis 1 posited that rivalry is negatively related to team learning behaviors. The results of the mediation analysis revealed that a high level of the rivalry in team is not associated with a low level of team learning behaviors ( $\beta = -0.83$ , boot 95%CI [-1.39; 0.05]), thus not providing support for Hypothesis 1.

Hypothesis 2 posited that team learning behaviors are positively related to team performance. As not expected, the results of the mediation analysis have shown that a high level of team learning behaviors did not predict a high level of perceived team performance ( $\beta = 0.24$ , boot 95%CI [-0.13; 0.42]).

Hypothesis 3 posited that team learning behaviors will partially mediate the relationship between rivalry and perceived team performance. In addition to the non-significant relation between rivalry and team learning behaviors, on one side, and team learning behaviors and perceived team performance, on the other side, there was no significant relationship between rivalry and team performance ( $\beta = -0.16$ , boot 95%CI [-0.34; 0.61]). We found that rivalry in team was not linked to perceived team performance through team learning behaviors. Specifically, rivalry had not a significant total effect on perceived team performance ( $R^2 = 0.00$ ,  $F(1,53) = 0.05$ ,  $p > 0.05$ ,  $-0.04$ , 95% CI = [-0.39; 0.31]). Both the direct effect ( $0.16$ ,  $p < 0.05$ , 95% CI = [-0.16; 0.48]) and the indirect effect ( $-0.20$ , boot 95%CI = [-0.41; 0.14]) did not reach statistical significance. These results, as reported in Tables 2 and 3 below, show that the proposed linkages between rivalry and perceived team performance through team learning behaviors were not fully empirically supported as expected.

**Table 2.** Results of the mediated relationship (bootstrapping technique).

	Team Learning Behaviors				Perceived Team Performance			
	$\beta$	BootM	BootSE	Bootstrap 95% Confidence Interval	$\beta$	BootM	BootSE	Bootstrap 95% Confidence Interval
1. Rivalry in team	0.83	-0.78	0.37	-1.39 0.05	0.16	0.10	0.25	-0.34 0.61
2. Team learning behaviors					0.24	0.18	0.17	-0.13 0.42

**Table 3.** Results of the mediated relationship.

	Team Learning Behaviors				Perceived Team Performance			
	$\beta$	t	p	95% Confidence Interval	$\beta$	t	p	95% Confidence Interval
1. Rivalry in team	-0.83	-2.30	0.03	-1.55 -0.11	0.16	1.01	0.32	-0.16 0.48
2. Team learning behaviors					0.24	4.14	0.0001	0.12 0.36

### 3. Discussion

Our results, as presented above, show that we do not have empirical support for our hypotheses. While the initial correlations between our variables suggested we should further explore the effect of rivalry on performance mediated by team learning behaviors, our mediation hypothesis was not supported for this particular sample. It is highly possible that this occurred due to the lack of variance with regard to rivalry in our teams. We know from the relational aspect in the conceptualizations of rivalry that prior interaction between group members needs to be investigated in order to be able to better understand rivalry effects on team performance (Kilduff et al. 2010; Kilduff 2014). We also know from existing literature that similarity is one of the antecedents of rivalry in competition settings (McPherson et al. 2001). For the purpose of our research, we challenged and expanded the existing research on rivalry by considering intra-team status similarity in a career-related group task within a collaborative cognitive task. Even if the participants share prior experience of competition, they were encouraged to collaborate to better understand and collectively approach the complex project.

A possible explanation for the fact that we found no relationship between team learning behaviors and team performance could be that team performance was measured as team output, and the data comes from peer evaluations. We did not account for, or control for, between team interactions; therefore, while peers were able to evaluate the final outcome of team processes, they did not rate performance keeping in mind team learning processes and behaviors per se.

We proposed a partial mediation between rivalry and performance and have focused on team learning behaviors as the mediator in this study. That is to say that we fully acknowledge the fact that other mediators could have a role in explaining the relationship between the two concepts. For example, we know from previous studies that team cohesion is a mediator between negative relations within a team and team performance (de Jong et al. 2014). As the negative effect of team rivalry on performance has hardly been studied, and specifically, to our knowledge, not in collaborative cognitive tasks, there are too many potential variables impacting this relationship to have been thoroughly unpacked and discussed within our research. As team rivalry could have a negative impact on team cohesion, this could offer a potential other mediating mechanism between rivalry and team performance.

Moreover, we might consider that simple mediation does not in fact explain the mechanisms behind this negative impact that we argue team rivalry has on team performance. We could in fact be looking into serial mediation mechanisms (Hayes 2018), where team rivalry negatively impacts psychological safety because of the fact that team members who perceive their colleagues as competitors are less likely to engage in sharing behaviors as they no longer perceive the team climate as safe for interpersonal risk taking, or assume that their contributions may be contorted by their rivals. Literature shows that psychological safety is directly linked to team learning climate (Edmondson 1999; Harvey

et al. 2019) and once psychological safety declines, team learning behaviors are also likely to decline, which in turn could have a negative impact on performance.

Our main contribution to the literature is expanding the understanding of the concept of team rivalry. We did this in two ways. First, by introducing rivalry in a collaborative task setting and conceptualizing it as a team input and as being directed towards team members as opposed to its usual analysis where it is directed towards rival teams/individuals, in a competition setting. Second, we show that there is support to go beyond its positive effects on motivation and effort and discuss potential negative effects that stem from envy and jealousy and that drive negative behavioral consequences. While this aspect has been previously researched (Kistruck et al. 2016; Yip et al. 2018), it was still done within sport competition instances, while our study looks into these effects in complex collaborative cognitive tasks. We believe we breached this gap in the literature by showing how rivalry can and should be included with the literature on negative relations within teams performing collaborative cognitive tasks. While our results show that for this particular sample the hypotheses do not hold, the negative correlation between rivalry and team learning behaviors provides ground to be further explored.

A second contribution is with regard to the insights we propose on collaborative learning within educational settings. This was not the primary focus of our study, as we have aimed to show the mediating effect that team learning behaviors have on the relationship between rivalry and team performance irrespective of the collaborative task setting. However, when going deeper into our data and trying to understand why our hypotheses were not supported, we had some insights on how student collaborative tasks play out. For this we suggest a series of explanations, which we present below.

While our results do not confirm our initial hypotheses they are not entirely surprising in the context of student teams. In collaborative learning educational settings, most student group interactions were related to coordination and planning of the group activity, and less with task related collaboration (Vuopala et al. 2015). Hence, groups were more actively involved in dividing the task among group members and less on knowledge integration and being mutually engaged in task completion. This raises questions with regard to the way in which they perceive the task as being interdependent. In their meta-analytic study, Marlow et al. showed that task interdependence moderates the relationship between team communication and team performance (Marlow et al. 2018). Moreover, de Jong et al. (2014) showed that high task interdependence neutralizes the damaging effect that negative relations in a team have on team performance, due to the fact that it moderates the relationship between negative relations within a team and team cohesion. This only works though if the team itself perceives the task as being interdependent and acts accordingly, engaging therefore in collaboration. This may be problematic in student groups. Collaborative learning student groups' attitudes toward group work are highly related to previous workgroup experiences (Hillyard et al. 2010). Their history as a group in previous class projects has provided them with a series of mechanisms for dealing with group tasks that do not necessarily involve collaboration for the completion of their class projects. Our results from a mixed methods study (Oțoiu and Rațiu 2019; Oțoiu et al. 2019) show that student teams are likely to fall back on these mechanisms (i.e., dividing the tasks from the beginning, dividing work in between various group projects where some members work on one project and other work on a different project), even when faced with a task that was presented to them by the instructors as being highly interdependent. Considering these aspects related to task perception, we expect that the team outcome is not in fact a product of team learning, but rather of team coordination activities. As such, team learning behaviors are less likely to occur in the way that they contribute to knowledge co-creation. We should therefore consider more cooperative learning behaviors, than bank on the existence of collaborative learning behaviors (Edmondson 1999; Vuopala et al. 2015).

Moreover, in our study, student learning teams were established by the instructors, in alphabetical order, which means that there was variety in terms of team member familiarity. We worked with a large class (of approximately 300 students), and thus, some of them were more familiar with their team members and others less familiar. Team familiarity has been consistently shown to have a positive



impact on team performance (Mathieu et al. 2017). Our participants' report (Oțoiu and Rațiu 2019; Oțoiu et al. 2019) that they normally work in self-organized groups with people they know and like; hence, the low familiarity in this particular case was unsettling for most of them. Consequently, their initial expectations with regard to task performance were low.

Sleesman et al. (2018) discuss initial performance expectations in groups, and they identify a self-fulfilling prophecy effect with regard to this. They argue that once a team receives a new task, they make a first evaluation of their future performance on that task, which in turn, they found, relates to the actual performance at the completion of the task. Furthermore, they show that even before team members interact sufficiently to know each other and have a common understanding of the task, they frame it in terms of a loss-or-gain context. This framing then impacts their willingness to take task related risks and hence influences the final outcome. When, as in the case of our sample, familiarity is low for most of the team members, individuals are more likely to revert to this initial evaluation and frame it in terms of a loss-context, since they lack certitude with regard to how their team members are going to engage the task at hand. We believe these cross level effects of motivational mechanisms (Chen and Kanfer 2006; Chen et al. 2009), from individual motivation towards obtaining high performance in a particular class, to the aggregated group level motivation for high performance at first instances when presented with a new group task, impact their overall team performance. Consequently, considering these findings, we believe that lack of motivation for task involvement, task division and independent work in our teams of participants led to poor engagement in learning behaviors, which in turn could explain the reason why our initial hypothesis with regard to the impact of learning behaviors on team performance was not supported.

In view of our findings from this research and two other works that are currently in progress (Oțoiu and Rațiu 2019; Oțoiu et al. 2019), we propose that future research in collaborative learning in educational settings should further explore the particular nature of student teams. More specific, a good starting point would be to investigate their perception on their status as a team, and to encourage reflexivity with regard to the nature of their task. Blanchard et al. (2018) discuss the effects that team entitativity has on team performance. Team entitativity is defined as the perception teams have on their actually being a team. It is linked to having clear common goals, similarity between group members and a perception that a certain task can only be accomplished if group members work as a team. This also touches on issues of task interdependence perceptions and its investigation could provide more information on the mindset of the team when engaging with a collaborative learning task. Finally, our findings also suggest that team entitativity is probably low in our samples; therefore, we should also probably further explore whether these students groups could be conceptualized as real teams or whether they could be better conceptualized as pseudo-teams, as per the recommendations of West and Lyubovnikova (2012).

Our work is of course not without limitations. A first limitation of the present study concerns the sample size ( $N = 55$ ). Although it is in line with other research on teams (Mello and Delise 2015), it is a small sample that limits statistical power of our study. As shown by the two mediation analyses we performed (with and without bootstrap technique), the statistical significance of the tested relationships varies. Specifically, while the mediation analysis with bootstrap technique shown no significant relationships between the examined variables, the mediation analysis without bootstrap technique shown significant relationships between rivalry in team and team learning behaviors, and team learning behaviors and team performance.

Furthermore, our research design was not fully a cross-lagged one as data on team rivalry and team learning behaviors were collected in the same point in time, at the beginning of the task. Only data on team performance were collected later in time. Thus, our data are correlational in nature. We employed a research design that is rather weak in detecting the causality nature of the relationships between variables in comparison to longitudinal and experimental designs.

Moreover, rivalry in teams was measured using only one item. While we acknowledge the fact that multiple-item measures are preferable from a psychometric standpoint (Wanous and Hudy 2001),

we opted for a single-item measure for several reasons. First, literature on rivalry does not offer ready to use measures with regard to rivalry in collaborative settings. Most studies focus either on dyadic effects in competition settings or on looking into rivalry between teams in competition settings, or even rivalry in between groups of supporters of the sports teams in competition. Second, even when studies did attempt to develop a rivalry measure (i.e., Yip et al. 2018), factor analysis did not support the factorial structure of these measures. Third, we would like to emphasize that previous research has recognized that for global constructs single and multiple item measures have been found to perform very similarly (Barrett and Paltiel 1996; Bowling 2005). Studies measuring different psychological constructs have shown that single-item measures are an effective alternative to traditional multiple-item measures (i.e., job satisfaction—Nagy 2002; attitudes toward advertisements—Bergkvist and Rossiter 2007; the Big Five personality traits—Brown and Grice 2011; Woods and Hampson 2005). Fourth, multiple authors suggested that in comparison to multiple-item measures single-item measures provide the benefits of ease and brevity of administration (Barrett and Paltiel 1996), reduce criterion contamination, and increase face validity (Fisher et al. 2016).

A further limitation to our work is the fact that we have used student teams for our sample, but this was not a matter of convenience sampling. There is ample research into collaborative tasks in educational environments (Hillyard et al. 2010) and there is sufficient evidence that team processes and emergent states have been successfully unpacked when using student teams (Coman et al. 2019; Fodor et al. 2018). Moreover, there are a number of studies that show that teamwork competencies are worth developing in educational settings as they have lasting effects on future team performance related aspects that could impact performance in work settings. There is a longstanding argument that the learning environment in universities should better reflect the complexity of the actual work environment that students will have to deal with once they graduate (Axley and McMahon 2006). Limiting the learning experience to individual and mechanistic tasks is no longer sufficient for developing relevant competencies and skills.

Moreover, individual learning is no longer strictly a question of acquisition, but also a question of interaction (Klabbers 2000), which emphasizes the need for instructors to develop collaborative learning environments and experiences. These have been linked to better leadership competencies development (Posner 2012), to entrepreneurial intention and competencies (Córcoles-Muñoz et al. 2019; González Moreno et al. 2019), and to higher acquisition of practical skills (Oțoiu and Oțoiu 2012). When they are absent from educational settings, first experiences with working within a team, especially in high stress environments, are reported to have a negative effect on team integration efforts and on positive team emergent states development (Oțoiu et al. 2012). Given the complexity of most organizational settings nowadays, teamwork competencies are essential for effective work teams, and these competencies should already be acquired while in educational settings. However, for this to work, there is a need to understand what collaboration and interaction among team members entails in such settings (Vuopala et al. 2015) and how they are linked to team performance. Hence, the need to further explore collaborative learning tasks in educational settings and the unveiling of the team emergent states and team processes that fuel them.

While we acknowledge the limitations to this work, we also believe there are a few future research directions worth following. In this study, we looked at rivalry as a team input, within the larger Input-Mediator-Output team effectiveness framework (Mathieu et al. 2019). We believe that, while this is something that is worth exploring further, from a system dynamics point of view, future research should also consider looking into rivalry over time and further explore it both as input, but also an emergent state. Longitudinal designs could offer more insight into the mechanisms of team rivalry in collaborative tasks. Furthermore, also in line with the system dynamics perspective, we believe that even within collaborative settings, rivalry could have both primary and secondary effects on performance. While in initial interactions it could boost individual motivation and task effort, as a means of demonstrating one's own worth for the team, at different points in time it could generate counterproductive behaviors like knowledge hiding and hence have a negative effect on

performance. Existing literature does not, as yet, offer knowledge on the amount of rivalry that can increase motivation. Looking into nonlinear effects and trying to identify an inflection point when these positive effects turn towards counterproductive is another research avenue worth following.

#### 4. Materials and Methods

##### 4.1. Sample

To test the hypotheses, we employed a time-lagged, survey-based design in a higher education setting. Two hundred and ninety students enrolled in an undergraduate organizational psychology course at a large Eastern European university were invited to participate in this field study. The students were assigned to teams of four-six members, in alphabetical order, during the first course meeting and they were not allowed to change membership throughout the duration of the course (14 weeks; one semester). During their time together as a team they had to self-manage and complete a team research project until the end of the semester. We collected the data by asking the participants to fill in questionnaires in two of the class meetings. All questionnaires were completed during the last minutes of class, with one of the researchers present. Data were collected in two waves from two different sources to avoid potential problems associated with common method variance (Podsakoff and Organ 1986). Specifically, the team members self-reported on the demographic and independent variables. Data on the dependent variable were collected in a round robin manner where each team was supposed to rate all others' team performance.

At T1, 176 students completed the questionnaires comprising the items of team rivalry and team learning behaviors. These students were included in 55 teams. At T2, all the 55 teams had their scores on team performance. The average team size was 3.92 (ranging from two to six,  $SD = 0.93$ ). The mean respondent age of the 124 participants that reported their age was 21.65 (ranging from 20 to 30 years,  $SD = 1.39$ ), with 137 women (77.84%) and 39 men (22.16%). The study was carried out in accordance with the recommendations of the guidelines of research involving human subjects. We assured the students that the data collected would remain strictly confidential and used for research purposes only.

##### 4.2. Measures

The T1 questionnaire included the measures for both team rivalry and team learning behaviors. The T2 questionnaire included the measures for team performance. The measures for demographic data were collected at the beginning of the class. All questionnaires included instructions for participants to consider their experiences in their current work teams when responding to the questions. The instruments used were the following.

###### 1. Team rivalry

Team rivalry was measured using one-item scale extracted from relationship conflict scale of Jehn (1994). The item was: "How much jealousy or rivalry is there among the members of your team?" The participants rated team rivalry on a five-point Likert scale ranging from 1 as "not at all" to 5 as "very much" ( $r_{WG} = 0.94$ ;  $SD = 0.16$ ;  $ICC1 = 0.13$ ;  $ICC = 0.32$ ).

###### 2. Team learning behaviors

Team learning behaviors were measured using the unidimensional seven-item scale developed by Edmondson (1999) and captured "the activities carried out by team members through which a team obtains and processes data that allow it to adapt and improve" (Edmondson 1999, p. 353). Team learning behavior includes items as "We regularly take time to figure out ways to improve our team's work process". Each item was rated using a seven-point Likert scale ranging from 1 as "strongly disagree" to 7 as "strongly agree" ( $r_{WG(j)} = 0.98$ ;  $SD = 0.01$ ;  $ICC1 = 0.50$ ;  $ICC2 = 0.77$ )

###### 3. Measures of team performance

Team performance was measured at the end of the semester, on a scale of 0 to 2, also during a class session. During this session, all groups presented their work with all other groups being there for the presentation. Each group outcome was then evaluated on a scale with regard to the number and the quality of the concepts students' teams documented for the project, the quality of explanation and the quality of the presentation. It was a round robin type of evaluation in the sense that every team evaluated every other team in the class. We know from research on student assessment and evaluation that peer evaluation is used to reduce evaluation biases and that it also improves aspect validity with regard to evaluation procedures (Schmulian and Coetzee 2019). In our case, the student teams functioned as subject matter experts, as they all had to go through the process of working on a team project, they were all subjected to feedback from peers as well as from class instructors when presenting their work, and they all studied the same basic theoretical concepts that they had to later develop in their group work. Moreover, as we have previously shown, they had to rate their own understanding of the concepts integrated by their peers in their work and the extent to which they believed their peers did a convincing job when arguing their work. They evaluated the team outcome; they did not evaluate the team processes behind the work, to which they may or may not have been privy to, which we do not know since we did not control for between-group interaction throughout the semester. As already mentioned, data were collected in a round robin manner and a mean score was computed for each team.

## 5. Conclusions

The present study is, to our knowledge, a first attempt to discuss team rivalry outside of the competition settings it has been previously studied in. We argue that when rivalry is present within a team, and is not directed outward towards a rival team, but rather inwards towards one's own team members when working on a collaborative task, rivalry has a negative impact on team performance. Rivalry being a team input, we argued that this negative relationship is not direct, but mediated by a series of team emergent states and team processes; within this study, we specifically focused on its negative impact on team learning behaviors. By limiting learning behaviors, rivalry has a damaging effect on team performance and outcomes. While our hypotheses were not supported, there is some evidence that our research endeavor is worth expanding and we discuss some of the ways in which rivalry could be better integrated within team research in relation to collaborative team processes and team outcomes.

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