

Collective Efficacy in Work Teams: How Team Confidence Impacts Team Outcomes

by

Alexandria Elms

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ABSTRACT

COLLECTIVE EFFICACY IN WORK TEAMS: HOW TEAM CONFIDENCE IMPACTS TEAM OUTCOMES

Alexandria Elms
University of Guelph, 2019

Advisor:
Dr. Harjinder Gill

The present study aimed to investigate the relation of collective efficacy and team outcomes, including team performance and team satisfaction. This study also examined team processes as a mediator between collective efficacy and team outcomes. Research has shown a positive linear relation between collective efficacy and performance; however, recent findings have alluded to excessive efficacy as being detrimental to team performance. Survey methodology was used to assess two samples of university class teams. Results indicated a positive linear relation between collective efficacy and team performance perceptions and satisfaction. Additionally, team processes mediated the relation between collective efficacy and team performance perceptions and satisfaction. No relation was found between collective efficacy and team grades, the objective performance measure. The findings provide further empirical evidence for the benefits of collective efficacy on team outcomes and provides evidence for team processes as an explanatory mechanism.

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Collective Efficacy in Work Teams: How Team Confidence Impacts Team Outcomes

The use of work teams is becoming more prevalent as organizations are stepping away from the traditional hierarchical structure (Devine, Clayton, Philips, Dunford, & Melner, 1999). According to Deloitte's 2016 Global Human Capital Trend report, organizations are now structuring themselves as a "network of teams" to ensure agility and to better meet customer needs (Bersin, Geller, Wakefield, & Walsh, 2016). As many as 92% of organizations value redesign and are seeking to implement adaptable teams in lieu of a formal hierarchy (McDowell, Agarwell, Miller, Okamoto, & Page, 2016). With this influx of structural change, it is imperative to consider how working in teams impacts employees and organizational outcomes.

One organizational outcome that businesses value is performance. Organizational performance is important as it allows businesses to meet strategic objectives and increase profits. Current organizations are using more teams in the hopes of increasing organizational performance (Bersin et al., 2016). Thus, it is essential we understand how and when teams perform at their best.

A key driver of team performance is confidence in the team's ability to complete the task at hand (Bandura, 1997). A team's confidence in their abilities influences the amount of effort they expend and their motivation (Bandura, 1997). Meta-analytic evidence has found collective efficacy, team members' shared belief in the ability of their team to successfully accomplish a task, to be positively related to team performance (Gully, Incalcaterra, Joshi, & Beaubien, 2002; Stajkovic, Lee, & Nyberg, 2009). However, emerging evidence has alluded to a more complex relationship between collective efficacy and team performance, with research suggesting more efficacy may not always be beneficial to performance (Rapp, Bachrach, Rapp, & Mullins, 2014).

A second organizational outcome that businesses value is employee satisfaction. Within the context of work teams, satisfaction can impact the physical and psychological health of team members (Sonnentag, 1996; Sundstrom, De Meuse, & Futrell, 1990). Team satisfaction can also influence the development of the team (Hackman, 1987). Therefore, understanding how to cultivate team satisfaction can benefit an organization and their employees.

Recent evidence has shown that collective efficacy may positively influence team satisfaction (Luu & Narayan, 2017). Collective efficacy has the power to influence the emotions of team members and thus may impact the members feelings of satisfaction (DeRue, Hollenbeck, Ilgen, & Feltz, 2010). However, relatively few studies have examined the relation between collective efficacy and satisfaction.

This study has three main goals to address the inconsistencies in the literature and expand upon current knowledge of work teams. The first goal is to examine the relation between collective efficacy and team performance. Some recent findings have suggested that too much collective efficacy can have a negative effect on team performance (Goncalo et al., 2010; Park, Kim, & Gully, 2017; Rapp et al., 2014; Tasa & Whyte, 2005). Very high collective efficacy may be negatively impacting the processes that teams are engaging in and ultimately their performance (e.g., Rapp et al., 2014; Tasa & Whyte, 2005). The second goal of the study is to investigate the relation between collective efficacy and team satisfaction as this is a relatively understudied relation in the literature. The third goal of the study is to examine if team processes are the mechanism through which collective efficacy impacts team outcomes, including performance and satisfaction.

Input-Process-Output Model

The input-process-output (IPO) framework is widely used to understand team dynamics and their outcomes (e.g., Antoni & Hertel, 2009). Steiner (1972) and McGrath (1984) originally used IPO models as a systems model to understand how inputs and processes relate to team performance. Inputs, processes, and outputs are all team level variables. Inputs can be psychosocial traits or emergent states, such as cohesion or team attitudes (Cohen & Bailey, 1997; McGrath, 1984; Steiner, 1972). Inputs influence processes. Processes are behavioural, cognitive, or verbal acts. Processes mediate the relationship between inputs and outputs (Marks, Mathieu, & Zaccarto, 2001; McGrath, 1984; Steiner, 1972). Outputs are the outcome of the input and processes. Outputs are often measured as team performance or satisfaction (McGrath, 1984; Steiner, 1972). In summary, inputs affect processes which affect outputs, and processes mediate the relationship between inputs and outputs (McGrath, 1984; Steiner, 1972). In this study, I will use the IPO framework to examine how the input of collective efficacy impacts team processes and how they ultimately influence the outputs of team performance and team satisfaction.

Collective Efficacy in Teams

Collective efficacy is a facet of social cognitive theory which asserts that learning is a result of an individual's socialization (Bandura, 1982). Social cognitive theory provides a framework for understanding how people form beliefs regarding their ability to successfully complete a task. These beliefs are one's perceived self-efficacy for the task (Bandura, 1982; Bandura, 1997). Self-efficacy is an individual level construct however Bandura (1997) extended this concept to the group level. Collective efficacy is defined as "a group's belief in their conjoint capabilities to organize and execute the courses of action required to produce given level of attainments" (Bandura, 1997, p. 477). Collective efficacy is solely focused on the team's

capabilities and is not measured by how confident an individual is in themselves or in another team member but rather every member's confidence in the whole team.

Furthermore, it is important to differentiate between collective efficacy and group potency. Group potency is a general belief in the team's capabilities and is not task specific (Bandura, 1997; Guzzo, 1993). Potency is a broader construct, whereas collective efficacy is task specific (Bandura, 1997). Although there is overlap between group potency and collective efficacy, there is research evidence that indicates they are distinct constructs (e.g., Collins & Parker, 2010).

Team Performance

Team performance has become a widely studied variable in organizations and such has been conceptualized in different ways. Performance can be conceptualized as either objective or subjective. Objective performance measures are behaviours or outcomes and are typically the result of the performance on the job (Bommer, Johnson, Rich, Podsakoff & Mackenzie, 1995; Sturman, 2003). An example of an objective performance measure is quarterly sales. Subjective performance is based on an individual or a group rating of performance (Bommer et al., 1995). An example of a subjective performance measure is supervisor or team ratings of performance. However, there are limitations to both conceptualizations and subsequent measures. Objective measures have been criticized for being narrow and not capturing all aspects of performance. Many objective measures assess one lower order facet of performance and thus may not be fully representative of the higher order performance construct (Bommer et al., 1995; Sturman, 2003). Subjective measures have been criticized for being unreliable or biased (Bommer et al., 1995). Researchers assert that subjective measures leave room for random error and are subject to rater bias (Bommer et al., 1995; Campbell, 1990). Moreover, objective and subjective measures of

performance have previously shown to be correlated (Bommer et al., 1995). However, researchers have argued that despite this correlation objective and subjective measures are not interchangeable (Bommer et al., 1995). Thus, to account for limitations and to ensure a holistic measurement of performance, this study will use both objective and subjective measures of performance.

Collective Efficacy and Team Performance

Literature demonstrates that collective efficacy is a motivating factor for teams and ultimately a contributor to team performance (Goncalo et al., 2010). Collective efficacy in teams has the power to motivate members and provide direction for effort (Fuller, Hardin, & Davidson, 2007). If the members of a team believe in the ability of the team to effectively execute tasks then the team will work harder, collaborate as a team, and have more positive interactions (Bandura, 1997; Lindsley, Brass, & Thomas, 1995). Moreover, teams with higher collective efficacy are more likely to trust and communicate with other members and engage in process behaviours relevant to accomplishing the goals of the group (DeRue et al., 2010). Meta-analytic evidence demonstrates a moderate positive relationship between collective efficacy and team performance (Gully et al., 2002; Stajkovic et al., 2009).

However, several studies are inconsistent with the positive meta-analytic results, suggesting there may be underlying complexities to the relationship between collective efficacy and team performance. Studies have reported no relationship or a negative relationship between collective efficacy and team performance (e.g., Chen & Lee, 2007; Goncalo et al., 2010; Katz-Navon & Erez, 2005). These findings appear to be counterintuitive to the argument that higher collective efficacy is beneficial and indicate that under some circumstances collective efficacy may not impact or may even harm team performance. Researchers have also theorized that too

much collective efficacy may hinder performance, as teams may become overconfident and fail to engage in vital team processes as well as take inapt risks (Audia, Locke, & Smith, 2000; Gist, 1987; Knight, Durham, & Locke, 2001; Lindsley et al., 1995; Whyte, 1998). Consequently, too much collective efficacy may harm team performance.

In response to concerns surrounding the possible ill-effects of too much collective efficacy, some researchers have proposed that collective efficacy may have a curvilinear relationship with beneficial team outcomes (e.g., Rapp et al., 2014; Tasa & Whyte, 2005). An empirical laboratory study found support for a curvilinear relationship between collective efficacy and vigilant problem solving in teams (Tasa & Whyte, 2005). Teams with higher levels of collective efficacy made lower quality decisions when compared to teams with moderate levels of collective efficacy (Tasa & Whyte, 2005). Subsequently, two studies emerged that found empirical support for a curvilinear relationship between collective efficacy and team performance (Park et al., 2017; Rapp et al., 2014). Findings from both studies showed that collective efficacy was advantageous until a certain point, after which greater efficacy lead to detrimental effects for team performance (Park et al., 2017; Rapp et al., 2014). Researchers postulated that overconfidence from too much collective efficacy could lead to an inability to recognize flaws in processes and that groups may have too much faith in the proficiencies of their members (Chou, Lin, & Chou, 2012; Rapp et al., 2014).

Given these recent developments in the relationship between collective efficacy and team performance, I test whether there is support for a non-linear relationship. The first part of the initial hypothesis predicts a linear relationship because one must statistically account for the linear trend before testing for the quadratic trend. Therefore, I hypothesize the following:

H1a: Collective efficacy will be positively related to team performance.

H1b: The relation between collective efficacy and team performance will have a negative quadratic trend, such that the relation between collective efficacy and team performance will attenuate for higher values of collective efficacy.

Given the evolving view of the collective efficacy - team performance relationship it is important to concretely establish the mechanism through which collective efficacy impacts team performance. In past research, the relationship between these two variables has been explained by the motivation behind collective efficacy (Bandura, 1997). However, motivation does not elucidate the specific behaviours and processes engaged in by teams. Therefore, it is important to examine what processes teams are engaging in and if these processes impact their team performance.

Team Processes

To further understand the relationship between collective efficacy and team performance it is vital to look at the processes that team members utilize to complete work tasks. Team processes are defined as “members interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioural activities, directed toward organizing task work to achieve collective goals” (Marks et al., 2001, p. 357). Marks et al. (2001) categorize team processes into three dimensions: transition, action, and interpersonal processes. These dimensions are subsumed under the higher order construct of team processes, as they all describe different forms of team interaction throughout the process of accomplishing goals (Marks et al., 2001).

The first dimension, transition processes, are processes that take place in the beginning of a project when teams are formulating how they will accomplish the task (Marks et al., 2001). Transition processes include behaviours such as specifying team goals, forming strategies, and evaluating the task, resources, and environment for the given situation (Marks et al., 2001).

The second dimension, action processes, is focused on the methods which a team uses to achieve their goal. Action processes include behaviours such as goal monitoring, assessing resources, supporting team members, and organizing team's efforts and actions to achieve goals (Marks et al., 2001). The third dimension, interpersonal processes, is focused on the interactions between team members. Interpersonal processes are behaviours centered on managing conflict, motivating and building confidence in team members, and regulating team members' emotions while working to accomplish the task (Marks et al., 2001).

According to the IPO model, team processes should affect team outcomes. Emergent states (inputs) such as collective efficacy impact team processes and then team processes influence team outcomes such as performance (Marks et al., 2001). In the literature, team processes have been positively related to team performance and effectiveness (e.g., Kozlowski & Ilgen, 2006; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). One meta-analysis that reviewed 138 studies positively linked all ten team processes and all three team process dimensions to team performance and member satisfaction (LePine et al., 2008). Evidently, the processes teams engage in influence team outcomes. Thus, understanding team processes is crucial to illuminating how collective efficacy can impact team performance and team satisfaction.

Collective Efficacy's Impact on Team Processes and Team Performance

Teams higher in collective efficacy may be engaging in more team processes, thus explaining the positive linear relation between collective efficacy and team performance (Gully et al., 2002; Stajkovic et al., 2009). Higher efficacy leads to a healthy confidence that translates into positive emotional interactions within the team and high engagement (DeRue et al., 2010). Accordingly, efficacious teams may engage in more interpersonal processes. Furthermore, teams higher in efficacy may engage in more transition and action processes. Higher efficacy can lead

to adaptability and adeptness at planning and structuring as well as setting appropriate goals (DeRue et al., 2010). Conversely, lower collective efficacy leads to an evocation of negative emotions and less engagement, thus reducing a team's likelihood of trusting and bonding with each other (Bandura, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Consequently, lower collective efficacy teams may engage in less interpersonal team processes such as affect management or motivation and confidence building. In addition, teams lower in collective efficacy may engage in less transition and action processes. The lack of confidence in teams lower in efficacy results in members who are less likely to engage in productive behaviours that could benefit their teams, such as devising a plan, formulating a strategy, and monitoring behaviour (Bandura, 1997; Ilgen et al., 2005; DeRue et al., 2010). Teams lower in collective efficacy may not be engaging in these team processes because the team may feel powerless and that failure is inevitable (Tasa & Whyte, 2005). The team does not feel capable of achieving a desirable performance outcome and thus believes there is no reason to engage in effective processes to complete the task. Thus, the more efficacious a team is, the more likely they will be to engage in team processes.

However, emerging evidence suggests that teams who are very high in collective efficacy may be overconfident and may not be engaging in as many team processes. Recent findings indicate that teams very high in collective efficacy are performing lower than previous findings would predict (Rapp et al., 2014; Park et al., 2017). This may be caused by a lack of engagement in vital team processes that would benefit the team and their performance. Teams very high in collective efficacy may set themselves up for a lower performance as they engage in less adaptive behaviours that would benefit their team. For instance, when those who are successful become complacent with vital decision-making the likelihood of consequent failure heightens

(Miller, 1994). Moreover, those with very high collective efficacy may be less responsive and less likely to adapt to feedback that can help them in future projects (Silver, Mitchell, & Gist, 1995). Thus, teams with very high collective efficacy may not be engaging in as many transition and action processes, such as mission analysis and systems monitoring. Further the probability of vigilant problem solving in a team may be reduced when a team has very high collective efficacy (Tasa & Whyte, 2005). Teams may be less likely to set goals, consider alternative approaches, and engage in risk management when efficacy is high (Tasa & Whyte, 2005). Hence, very high collective efficacy teams may not be engaging in vital team processes such as formulating strategies or contingency plans which are essential transition and action processes. Again, because one must statistically account for the linear trend before the quadratic trend, I hypothesize the following:

H2a: Collective efficacy will be positively related to team processes.

H2b: The relation between collective efficacy and team processes will have a negative quadratic trend, such that the relation between collective efficacy and team processes will attenuate for higher values of collective efficacy.

Furthermore, team processes have been positively associated with team performance in previous findings (Kozlowski & Ilgen, 2006; LePine et al., 2008; Marks et al., 2001). Engaging in a greater frequency of team processes leads to higher performance. Transition processes ensure teams are focused and prepared to complete the task (Marks et al., 2001). Action processes keep teams on track through monitoring behaviours that can proactively mitigate issues (Marks et al., 2001). Interpersonal processes help to bolster team cohesion and reduce conflict (Marks et al., 2001). Therefore, I hypothesize the following:

H3: Team processes will be positively related to team performance.

Moreover, I assert that the relationship between collective efficacy and team performance can be partially explained by team processes (see Figure 1). Collective efficacy may influence the amount of team processes engaged in and consequently impact team performance. This aligns with the IPO model as collective efficacy is an emergent state (Bandura, 1997) that is the input in the model. Collective efficacy then informs team processes, which mediates the relationship between team performance and collective efficacy. Therefore, I hypothesize the following:

H4: Team processes will partially mediate the relation between collective efficacy and team performance.

Collective Efficacy and Team Satisfaction

Collective efficacy may not just affect a team's performance, it may also impact team satisfaction. An efficacious team develops a suitable level of team confidence. Team confidence leads to more positive emotional responses from the members towards the team (Bandura, 1997; DeRue et al., 2010). These positive emotions may make team members feel more satisfied with their team as they associate their team with success. Teams higher in collective efficacy may also have more trust within their team and stronger bonding (DeRue et al., 2010). These stronger relationships may also bolster feelings of team satisfaction. Conversely, teams lower in efficacy elicit more negative emotions and have a collective feeling of helplessness (Bandura, 1997; DeRue et al., 2010; Ilgen et al., 2005). These adverse feelings associated with the team may reduce team member's feelings of satisfaction. A recent study has also shown a small positive relationship between collective efficacy and team satisfaction (Luu & Narayan, 2017). Thus, the level of collective efficacy in a team may influence the team's satisfaction level. Therefore, I hypothesize:

H5: Collective efficacy will be positively related to team satisfaction.

Team Processes and Team Satisfaction

Previous literature has demonstrated a positive link between team processes and team satisfaction. Meta-analytic evidence reveals that team processes are positively related to member satisfaction, with each one of the ten team processes being significantly related to satisfaction (LePine et al., 2008). Transition and action processes, such as goal setting or coordination, provide structure and clarity to a team. In turn, these processes can bolster the team's cooperation and ultimately their satisfaction (Pinto, Pinto, & Prescott, 1993). Interpersonal processes influence team satisfaction as they focus on managing conflict and affect of team members as well as providing motivation and building member confidence (Marks et al., 2001). Therefore, I predict that collective efficacy and team processes will be positively related to team satisfaction.

H6: Team processes will be positively related to team satisfaction.

Further, team processes may explain the relationship between collective efficacy and team satisfaction. Collective efficacy may impact a team's engagement in team processes which may ultimately influence the satisfaction of the team (see Figure 2). Again, this logic follows the IPO model with collective efficacy as an input, team processes as a process, and team satisfaction as an outcome. Due to the lack of research surrounding the collective efficacy – team satisfaction relationship, I am proposing only partial mediation of team processes. Therefore, I hypothesize:

H7: Team processes partially mediate a relation between collective efficacy and team satisfaction.

Methods

Participants

Participants were recruited from both a psychology and a business course at a Southwestern Ontario University. These courses were team based, requiring students to complete at least one team project together. Those who participated in the study received 4% towards their final grade in the course as compensation for their time. At the beginning of the semester, each instructor randomly assigned students to teams. These teams worked together throughout the semester to complete assignments and received a grade for each of these projects as a group (i.e., one grade per group per assignment). The assignments required task interdependence, as the courses encouraged students to distill the project into smaller tasks and delegate to members.

Psychology sample. There were 200 participants and 71 teams in the psychology sample after data cleaning and aggregation. The teams in the psychology sample ranged in size from two to four students. The average age of participants in the psychology sample was 19.92 ($SD = 2.53$) and 84% of the participants were female, 11% male, and 0.5% identified another gender or no gender (see Table 1 for descriptive statistics). In the psychology course, the teaching assistant appointed a project lead for each assignment to lead the team and manage the project. Each team member got a chance to be project lead once, as the project lead role rotated to a new team member each assignment.

Business sample. There were 382 participants and 55 teams in the business sample after data cleaning and aggregation. The teams in the business sample ranged in size from six to seven students. The average age of participants in the business sample was 18.74 ($SD = 0.85$) and 43% of the participants were female, 56% male, and 0.4% identified another gender or no gender (see

Table 2 for descriptive statistics). The business course did not have an appointed project lead for the assignment. However, team leads may have emerged organically in the teams for this course.

Procedure

A week after students were given their first assignment, they were asked to fill out an adapted Collective Efficacy measure (Riggs & Knight, 1994). The week interim was to allow the students time to interact with their team and to help form their initial collective efficacy beliefs. Once the students handed in their assignments, but before they received their grade, team processes, team satisfaction, and team performance perceptions were measured. Specifically, participants completed a condensed version of the Marks et al. (2001) Team Processes scale. This measure determined the extent to which their team engaged in the different team processes during the assignment. Team processes was measured at this time point to ensure all processes teams engaged in throughout the project were captured. Students then completed a team satisfaction measure that assessed members level of satisfaction with their team on this project after completing the team processes scale. Further, students completed a subjective performance measure that assessed how they perceived their team performed on this project. These measures were all assessed at the same time (i.e., one day after the project was due) to reduce any memory errors and to ensure the grades received did not impact the responses. Further, this reduced attrition in response rates as it only required participants to fill out surveys at two separate time points (instead of three or more). Approximately two weeks after the due date of the project, the assignment grades were collected for objective team performance data (See figure 3).

Measures

Collective efficacy, team processes, team performance perceptions, and team satisfaction were all measured at the individual level and aggregated to the team level. I chose to use

individual level measures for these variables to reduce any bias and discomfort that may have arisen from team discussion of the main variables (Stajkovic et al., 2009). The objective performance measure, grades, was collected at the team-level. The analyses were all conducted at the team-level. Collective efficacy, team performance perceptions, and team satisfaction classify as referent shift composition models and thus the items were adjusted to have the team as the referent instead of the individual (Chen & Bliese, 2002; Chen, Mathieu & Bliese, 2004).

Collective efficacy. The Riggs and Knight (1994) seven-item Collective Efficacy Beliefs Scale was used to measure each team's collective efficacy (see Appendix A). Some items from the original scale were amended to reflect the participants context (e.g., changed the referent from "department" to "team"). Participants rated how much they agreed with statements such as "The team I work with has above average ability" (Riggs & Knight, 1994). Each item was rated using a 7-point likert scale that ranged from "strongly disagree" to "strongly agree". The scale was internally consistent in both samples as the alpha reliability of this measure was .88 in the psychology sample and .86 in the business sample.

Team processes. Team processes was assessed using the Marks et al. (2001) Team Processes scale (see Appendix B). Team processes was measured as a single variable and was not differentiated by each dimension. Researchers have theorized that the three dimensions comprise a higher order general team processes variable and such team processes were not measured or analyzed as three separate dimensions in this study (LePine et al., 2008). Participants rated the extent to which their team engaged in team processes throughout the project on a 5-point likert scale, ranging from "not at all" to "to a very great extent." The current study used the condensed version of the measure (30-items) to eliminate unnecessary use of participants time and reduce the likelihood of the data being impacted by participant fatigue or

boredom. Further, several items were amended slightly for this study as the Marks et al. (2001) taxonomy is designed to be used in a workplace setting and thus some of the language did not fit the current study context. Both samples had a relatively high reliability for the overall team processes measure, with a Cronbach's alpha of .96 for the psychology sample and .91 for the business sample.

Team performance. Team performance was measured two ways. First, it was measured subjectively using an adapted three-item team performance perception measure (see Appendix C). The measure was adapted from Killumets, D'Innocenzo, Maynard, and Mathieu (2015) original team effectiveness measure. Participants were asked to rate the extent to which each statement applied to their team on a seven-point Likert scale, ranging from "strongly agree" to "strongly disagree." An example item is "This team delivers high-quality work." This performance measure was aggregated to the team level. This measure of team performance had a Cronbach's alpha of .92 for the psychology sample and .87 for the business sample.

Team performance was also measured objectively using the team grades for the assignment. Each team was given one grade that the whole group shared. Teaching assistants marked the assignments that the students handed in according to the rubric provided to them. Grades were expressed as percentages (i.e., 1-100%).

Team satisfaction. Team satisfaction was measured using an adapted three-item satisfaction measure (see Appendix D). The measure was adapted from Cammann, Fichman, Jenkins, and Klesh's (1983) job satisfaction measure. Participants were asked to rate the extent to which each statement applied to their team on a seven-point Likert scale, ranging from "strongly agree" to "strongly disagree." An example item is "All in all, everyone in the team is satisfied with the team." The alpha reliability for the psychology sample was .88 and .82 for the business

sample, indicating acceptable reliability for the satisfaction measure. This measure was aggregated to the team level.

Attention check. To ensure that the participants were answering the survey questions accurately and thoughtfully, two attention check items were included in the team processes scale. They were as follows “Please choose ‘to some extent’ for this question” and “Please choose ‘to a great extent’ for this question.” These items required the participant to be cognizant of the response they were clicking when filling out the survey and thus hopefully screened out inattentive participants.

Results

Data cleaning

Prior to analyzing the data, the data was cleaned. At this stage there were 304 participants in the psychology sample and 646 participants in the business sample. Any participants who did not complete at least one of the surveys were eliminated (psychology: $n = 13$; business: $n = 14$). Completion of a survey required name and group number as well as item responses for each measure. Participants who were eliminated in this round of data cleaning only provided their name and group number, but not their item responses to the measures. Next, any participants who accidentally completed a survey more than once had their subsequent submissions deleted and their first submission remained (psychology: $n = 14$; business: $n = 56$). If any participants did not answer both insufficient effort response questions correctly, they were deleted as it can be assumed they were not adequately focused on responding to the survey (psychology: $n = 31$; business: $n = 46$). Once the data was cleaned at the individual level, each participant was matched with their team. Teams were removed if the number of responses for a time point was less than half of the number of team members (psychology: $n = 12$; business: $n =$

10). After data cleaning there were 234 participants and 83 teams in the psychology samples (both fall and winter semester), and 520 participants and 75 teams in the business sample.

Preliminary Analysis

Data Pooling. Data collection took place within two different courses, a psychology course and a business course. Data was collected from the psychology course in the fall and winter semester and collected from the business course in the winter semester only. Thus, there were three separate data pools. To justify pooling of these separate data pools, the means for four variables of interest (efficacy, processes, performance perceptions, and satisfaction) were compared. Thus, four one-way ANOVAs were conducted to compare the three samples and determine if they could be combined. Each ANOVA yielded a statistically significant difference in group means of collective efficacy ($F(2, 660) = 45.12, p < .001$), team processes ($F(2, 605) = 18.61, p < .001$), team performance perceptions ($F(2, 604) = 10.80, p < .001$), and team satisfaction ($F(2, 604) = 18.69, p < .001$).

When the simple contrasts were examined, it was determined that the business student sample means were significantly different from the psychology students for collective efficacy ($t(660) = -9.49, p < .001$), team processes ($t(605) = -6.08, p < .001$), team performance perceptions ($t(604) = -4.61, p < .001$), and team satisfaction ($t(604) = -6.09, p < .001$). The contrasts also showed that there was no significant differences between the psychology students between the first and the second semester for collective efficacy ($t(660) = 0.73, p = 0.467$), team processes ($t(605) = 1.06, p = .292$), team performance perceptions ($t(604) = -0.14, p = .888$), and team satisfaction ($t(604) = 1.09, p = .274$). Based on the ANOVAs, the two samples from the psychology course were combined and the business students remained separate, creating two pools of data to be analyzed.

Team Aggregation. The main variables (with the exception of team grades) were examined using surveys that were taken by participants at the individual level. To justify aggregation, I used both agreement and reliability indices. Firstly, I assessed team agreement using the average deviation (AD) index. The AD index is similar to other team agreement indices, however it is not influenced by group size unlike other agreement indices, such as r_{wg} values (Bliese, 2016). AD values assess the within group agreement, based on the average deviation from the mean (Burke, Finkelstein & Dusig, 1999). Acceptable levels of agreement are seen when the average for the group is less than the number of response options when divided by six (Dunlap, Burke & Smith-Crowe, 2003). Any teams who did not reach acceptable levels of agreement with the main variables were removed from the sample. Based on these criteria, for the psychology sample, I removed 12 teams. For the business sample, I removed 20 teams. Therefore, there were 71 teams in the psychology sample and 55 teams in the business sample.

Team reliability was also assessed using intraclass correlation coefficients (ICC). ICC(1)s assess the amount of variance in a participant's response that can be attributed to group level properties (Bliese, 2000; James, 1982). ICC(2)s assess group mean reliability; however, this index is influenced by team size, such that the correlations can be underestimated for smaller groups (Bliese, 1998).

The ICC(1)s of the predictor and outcome variables for the psychology sample were all above the recommended 0.12 cutoff (see Table 3; James, 1982). The ICC(2)s for collective efficacy, team processes, and team satisfaction were above the minimum threshold of .40 (See Table 3; Cicchetti, 1994). The ICC(2) for team performance perceptions fell below this threshold. However, ICC(2) is impacted by group size and some of the teams included in the

psychology sample were dyads. Thus, I chose to aggregate to the team level for all of the variables measured at the individual level in the psychology sample.

All of the ICC(1)s for the business sample fell below the 0.12 cutoff (James, 1982), and the ICC(2) values showed unacceptable appropriateness for aggregation (See Table 3; Cicchetti, 1994; Glick, 1982; Klein et al., 2000). However, due to the homogeneity of the sample and the range restriction, it is expected that there would be a lack of group influence on the individual level responses and lower variability between groups, thereby producing lower ICC values. Researchers assert that taking a holistic view and contextualizing ICC values is vital and that it may still be acceptable to aggregate to the team level despite lower ICC values (Dixon & Cunningham, 2006; Klein et al., 2000). Therefore, the decision to aggregate the teams despite the lower ICC values was made, based on a holistic view of the sample and the AD values for the business sample.

Descriptive Statistics. Descriptive statistics for the psychology and business sample including mean, median, standard deviation, and Cronbach's alpha are in Table 1 and Table 2 respectively. The number of teams yielded did not meet the a priori power analysis estimate of 353 teams for power of .80. Thus, the results must be interpreted with caution as the study was underpowered.

Hypothesis Testing

All hypothesis testing analyses were conducted using R software. Linear regression was used to test hypotheses one, two, three, five, and six, which all proposed a linear or curvilinear relation between collective efficacy and team performance and satisfaction. A quadratic collective efficacy term was created and added to the linear equation when testing curvilinear relations. Standardized regression weights (i.e., beta-weights) are reported within the results

section. The mediation package in R was used to test hypotheses four and seven which proposed team processes as a mediator between collective efficacy and team performance and satisfaction (Tingley, Yamamoto, Hirose, Keele & Imai, 2014). Bootstrapping was also used to test for the indirect effects in the mediation models. See Table 4 for a summary of hypothesis testing results. See Table 5-10 for a summary of the regression results by sample and outcome.

Hypothesis 1. Hypothesis 1a asserted that collective efficacy would have a positive linear relation to team performance. Hypothesis 1b postulated that the relation between collective efficacy and team performance would have a negative quadratic trend, such that the relation between collective efficacy and team performance will attenuate for higher values of collective efficacy.

Psychology sample. Collective efficacy in the psychology sample did not yield a significant linear relation $\beta = 2.22$, 95% CI [-1.55, 5.98], $p = .245$, or quadratic relation $\beta = -2.10$, 95% CI [-5.87, 1.67], $p = .269$, with team grades $F(2, 68) = 1.11$, $p = .34$. However, a significant, positive linear trend between collective efficacy and team performance perceptions was found in the psychology sample $\beta = 0.51$, 95% CI [0.30, 0.72], $p < .001$, $F(1, 69) = 24.20$, with collective efficacy accounting for 26% of the variance in team performance perceptions (see Figure 4). There was no support in the psychology sample for a negative quadratic trend between collective efficacy and team performance perceptions, $\beta = -0.71$, 95% CI [-4.00, 2.58], $p = .670$, $F(2, 68) = 12.05$.

Business sample. Collective efficacy in the business sample also did not yield a significant linear relation $\beta = 2.46$, 95% CI [-2.49, 7.41], $p = .324$, or quadratic relation $\beta = -2.58$, 95% CI [-7.54, 2.37], $p = .300$, with team grades $F(2, 52) = 0.93$, $p = .400$. A significant, positive linear trend between collective efficacy and team performance perceptions was found in

the business sample $\beta = 0.32$, 95% *CI* [0.06, 0.58], $p < .05$, $F(1, 53) = 6.22$, with collective efficacy accounting for 11% of the variance in team performance perceptions (see Figure 5). There was no support in the business sample for a negative quadratic trend between collective efficacy and team performance perceptions, $\beta = -2.49$, 95% *CI* [-7.21, 2.23], $p = .294$, $F(2, 52) = 3.68$.

Overall, hypothesis 1a was partially supported in both samples, with a positive linear trend found between collective efficacy and the subjective of performance, team performance perceptions. Hypothesis 1b was not supported in either sample, as there was no support for a negative quadratic trend between collective efficacy and either performance measure.

Hypothesis 2. Hypothesis 2a asserted that collective efficacy would have a positive linear relation to team processes. Hypothesis 2b proposed a negative quadratic trend between collective efficacy and team processes.

Psychology sample. Within the psychology sample, a significant, positive linear trend between collective efficacy and team processes was found, $\beta = 0.52$, 95% *CI* [0.31, 0.72], $p < .001$, $F(1, 69) = 25.41$, with collective efficacy accounting for 27% of the variance in team process scores (see Figure 6). Further, the quadratic collective efficacy term did not significantly predict team processes, $\beta = 0.76$, 95% *CI* [-2.51, 4.03], $p = .644$, $F(2, 68) = 12.67$.

Business sample. Within the business sample, collective efficacy and team processes were also significantly positively related, $\beta = 0.28$, 95% *CI* [0.02, 0.55], $p < .05$, $F(1, 53) = 4.61$, with collective efficacy accounting for 8% of the variance in team process scores (see Figure 7). The quadratic term for collective efficacy did not significantly predict team processes within the business sample, $\beta = 0.33$, 95% *CI* [-4.50, 5.16], $p = .891$, $F(2, 52) = 2.27$.

Overall, in both samples there was support for a positive linear trend between collective efficacy and team processes and no evidence of a negative quadratic trend between these variables. Therefore, hypothesis 2a was supported and hypothesis 2b was not supported.

Hypothesis 3. The third hypothesis postulated that team processes would be positively related to team performance. Team performance was measured in two ways within this study, team grades and team performance perceptions.

Psychology sample. In the psychology sample, team processes were not significantly related to team grades, $\beta = 0.09$, 95% CI [-0.15, 0.33], $p = .793$, $F(1, 69) = 0.54$. However, team processes were significantly positively related to team performance perceptions $\beta = 0.74$, 95% CI [0.57, 0.90] $p < .001$, $F(1, 69) = 81.53$, with processes accounting for 54% of the variance in perceptions (see Figure 8).

Business sample. In the business sample, team processes were not significantly related to team grades, $\beta = 0.02$, 95% CI [-0.26, 0.29], $p = .894$, $F(1, 53) = 0.02$. However, team processes were significantly positively related to team performance perceptions $\beta = 0.71$, 95% CI [0.52, 0.91] $p < .001$, $F(1, 53) = 54.91$, with processes accounting for 51% of the variance in perceptions (see Figure 9).

Therefore, Hypothesis 3 was partially supported within both samples, as team processes were positively related to the subjective performance measure, team performance perceptions.

Hypothesis 4. The fourth hypothesis asserted that team processes would partially mediate the relation between collective efficacy and team performance.

Psychology sample. In the psychology sample, the standardized regression coefficients between collective efficacy and team grades $\beta = 2.22$, 95% CI [-1.55, 5.98], as well as team processes and team grades, $\beta = 0.09$, 95% CI [-0.15, 0.33], were non-significant, $R^2 = 0.03$,

$F(3,67) = 0.76, p = .520$. Thus, there was no support for mediation of the collective efficacy and team grade relation through team processes.

The relation between collective efficacy and team performance perceptions was mediated by team processes in the psychology sample, $R^2 = 0.56, F(2,68) = 43.98, p < .001$. The standardized regression coefficient between collective efficacy and team performance perceptions, $\beta = 0.51, 95\% CI [0.30, 0.72]$, shows a significant effect of efficacy on perceptions, $t = 4.92, p < .001, 95\% CI [0.24, 0.56]$. The standardized regression coefficient between collective efficacy and team processes, $\beta = 0.74, 95\% CI [0.57, 0.90]$, shows a significant effect of efficacy on processes, $t = 5.04, 95\% CI [0.21, 0.49], p < .001$. Using bootstrapping, the indirect effect was found to be significant, $p < .001, 95\% CI [0.16, 0.38]$, and the direct effect after taking into account team processes was also found to be significant, $p < .05, 95\% CI [0.01, 0.26]$. Therefore, within the psychology sample, team processes were found to partially mediate the relation between collective efficacy and team performance perceptions.

Business sample. In the business sample, the standardized regression coefficients between collective efficacy and team grades $\beta = 2.46, 95\% CI [-2.49, 7.41]$, as well as team processes and team grades, $\beta = 0.02, 95\% CI [-0.26, 0.29]$, were non-significant, $R^2 = 0.04, F(3, 51) = 0.67, p = 0.58$. Thus, there was no support for mediation of the collective efficacy and team grade relation through team processes in the business sample.

Moreover, in the business sample the relation between collective efficacy and team performance perceptions was mediated by team processes, $R^2 = 0.53, F(2, 52) = 28.75, p < .001$. The standardized regression coefficient between collective efficacy and team performance perceptions, $\beta = 0.32, 95\% CI [0.06, 0.58]$, shows a significant effect of efficacy on perceptions, $t = 2.49, p < .05, 95\% CI [0.05, 0.49]$. The standardized regression coefficient between collective

efficacy and team processes, $\beta = 0.71$, 95% *CI* [0.52, 0.91], shows a significant effect of efficacy on processes, $t = 2.15$, 95% *CI* [0.01, 0.24], $p < .05$. Using bootstrapping, the indirect effect was found to be significant, $p < .05$, 95% *CI* [0.01, 0.31], and the direct effect after taking into account team processes was found to be non-significant, $p = 2.40$, 95% *CI* [-0.08, 0.29]. Therefore, within the business sample, team processes were found to fully mediate the relation between collective efficacy and team performance perceptions as the direct effect was eliminated when the indirect effect was added to the regression equation.

Overall, in both samples the fourth hypothesis was partially supported as mediation was only present between collective efficacy and team performance perceptions. This is also with the exception of full mediation being found in the business sample as opposed to the hypothesized partial mediation.

Hypothesis 5. The fifth hypothesis asserted that collective efficacy would be positively related to team satisfaction. This hypothesis was exploratory as this relation is a relatively unexplored area within work team literature.

Psychology sample. In the psychology sample, there was a positive significant relation between collective efficacy and team satisfaction, $\beta = 0.60$, 95% *CI* [0.40, 0.79], $p < .001$, $F(1, 69) = 38.12$, with collective efficacy accounting for 36% of the variance in team satisfaction (see Figure 10).

Business sample. In the business sample, there was a positive significant relation between collective efficacy and team satisfaction as well, $\beta = 0.27$, 95% *CI* [0.00, 0.53], $p < .05$, $F(1, 53) = 4.04$, with collective efficacy accounting for 7% of the variance in team satisfaction (see Figure 11). Therefore, the fifth hypothesis was supported in both samples.

Hypothesis 6. The sixth hypothesis postulated that team processes would be positively related to team satisfaction.

Psychology sample. Team processes were significantly positively related to team satisfaction within the psychology sample, $\beta = 0.68$, 95% *CI* [0.51, 0.86], $p < .001$, $F(1, 69) = 60.70$. Within this sample, team processes accounted for 47% of the variance in team satisfaction (see Figure 12).

Business sample. Within the business sample, team processes were significantly positively related to team satisfaction as well, $\beta = 0.58$, 95% *CI* [0.36, 0.81], $p < .001$, $F(1, 53) = 27.41$, with team processes accounting for 34% of the variance in team satisfaction (see Figure 13). Thus, the sixth hypothesis was supported in both samples.

Hypothesis 7. The seventh hypothesis asserted that team processes would partially mediate a relation between collective efficacy and team satisfaction. This hypothesis was exploratory as this relation is a relatively unexplored area within work team literature.

Psychology sample. Within the psychology sample, the relation between collective efficacy and team satisfaction was mediated by team processes, $R^2 = 0.55$, $F(2, 68) = 41.20$, $p < .001$. The standardized regression coefficient between collective efficacy and team satisfaction, $\beta = 0.60$, 95% *CI* [0.40, 0.79], shows a significant effect of efficacy on satisfaction, $t = 6.17$, $p < .001$, 95% *CI* [0.15, 0.55]. The standardized regression coefficient between collective efficacy and team processes, $\beta = 0.68$, 95% *CI* [0.51, 0.86], shows a significant effect of efficacy on processes, $t = 5.04$, 95% *CI* [0.21, 0.49], $p < .001$. Using bootstrapping, the indirect effect was found to be significant, $p < .001$, 95% *CI* [0.15, 0.45], and the direct effect after taking into account team processes was also found to be significant, $p < .001$, 95% *CI* [0.15, 0.57].

Therefore, within the psychology sample, team processes were found to partially mediate the relation between collective efficacy and team satisfaction.

Business sample. Within the business sample, the relation between collective efficacy and team satisfaction was mediated by team processes, $R^2 = 0.35$, $F(2, 52) = 14.12$, $p < .001$. The standardized regression coefficient between collective efficacy and team satisfaction, $\beta = 0.27$, 95% CI [0.00, 0.53], shows a significant effect of efficacy on satisfaction, $t = 2.01$, $p < .05$, 95% CI [0.00, 0.51]. The standardized regression coefficient between collective efficacy and team processes, $\beta = 0.58$, 95% CI [0.36, 0.81], shows a significant effect of efficacy on processes, $t = 2.15$, 95% CI [0.01, 0.24], $p < .05$. Using bootstrapping, the indirect effect was found to be significant, $p < .05$, 95% CI [0.01, 0.32], and the direct effect after taking into account team processes was found to be non-significant, $p = .472$, 95% CI [-0.06, 0.64]. Therefore, within the business sample, team processes were found to fully mediate the relation between collective efficacy and team satisfaction as the direct effect was eliminated when the indirect effect was added to the regression equation.

Overall, in both samples the seventh hypothesis was supported, with the exception of full mediation being found in the business sample as opposed to the hypothesized partial mediation.

Discussion

The current study aimed to elucidate the nature of the relationship between collective efficacy and team outcomes as well as to determine the role team processes play in this relation. Results showed no support for a relationship between collective efficacy and the objective performance measure, grades, in both samples. Results showed strong support for a positive linear relation between collective efficacy and the subjective performance measure, team performance perceptions, in both samples. Results showed strong support for a positive linear

relationship between collective efficacy and team satisfaction in both samples. Finally, in both samples results indicated support for team processes as a mediating mechanism between collective efficacy and team performance perceptions as well as team satisfaction.

Team Performance

In both samples, collective efficacy was related to only the subjective measure of team performance, team performance perceptions. Collective efficacy was not related to team grades in either sample. The lack of a relation between collective efficacy and grades in this study was unexpected. There is overwhelming evidence in the literature of some form of relation between collective efficacy and team performance (e.g., Stajkovic et al., 2009). There are two possible explanations for the lack of a relation found between collective efficacy and grades in this study. One explanation for the lack of relation is that the lower sample size may have reduced the chances of detecting an effect of collective efficacy on grades. Another explanation is that there may have been an issue with the outcome measure itself, as grades did not correlate with any other measure in the study. Some teams may have lacked efficacy and may not have engaged in processes. However, one or two team members may have stepped up and completed the project despite the lack of confidence and team engagement in processes. Thus, the final product may have been the work of one or two students as opposed to the entire group, making collective efficacy less relevant to grades.

Despite the lack of relation between collective efficacy and grades, results from both samples yielded a positive linear relation between collective efficacy and team performance perceptions. Teams who were confident in their abilities to successfully complete a task were more likely to perceive that their team performed well. These findings did not align with the anticipated curvilinear relation between collective efficacy and team performance. Recent

empirical findings alluded to excessive collective efficacy as being detrimental to team performance (Park et al., 2017; Rapp et al., 2014). The positive linear relation found between collective efficacy and team performance perceptions in the present study has one possible explanation. Team performance perceptions may not have been influenced by any detrimental effects of too much collective efficacy. Team members who are confident may think the team performed well even if the team did not perform as well as the team perceived. Further, this finding could be further evidence that there is only a linear relation between collective efficacy and team performance, aligning with previous meta-analytic research (Gully et al., 2002; Stajkovic et al., 2009). Thus, very high collective efficacy may not have a negative impact on team performance.

Team Satisfaction

The present study also sought to examine the relation between collective efficacy and team satisfaction, a relatively understudied relation in the literature. In both samples, collective efficacy positively related to team satisfaction, with teams high in efficacy being more satisfied with their team. These findings align with another empirical study examining the relation between collective efficacy and team satisfaction, which highlighted a positive linear relation between these variables (Luu & Narayan, 2017). Researchers assert that high efficacy teams may associate more positive emotions with their team thus leading them to greater feelings of satisfaction (Bandura, 1997; DeRue et al., 2010). Therefore, findings support collective efficacy as an antecedent to team satisfaction.

Team Processes

The processes teams engaged in were also examined in relation to collective efficacy and team outcomes. Researchers have postulated that teams very high in collective efficacy would be

less likely to engage in vital team processes (Audia, et al., 2000; Gist, 1987; Knight, et al., 2001; Lindsley et al., 1995; Whyte, 1998). However, findings from both samples showed a positive linear relation between collective efficacy and team processes, with higher efficacy teams engaging in more team processes. The more confidence teams had in their ability to complete the task, the more behaviours they engaged in that led them to their goal. Teams very high in collective efficacy may still feel motivated to engage in these processes. Thus, the current study showed support for the benefits of collective efficacy on team process engagement.

Team processes were also positively related to team performance perceptions. Teams engaging in more team processes perceived that their team performed better. These findings align with research on team processes which highlight a positive relation between processes and team performance (LePine, et al., 2008). Team processes allow teams to strategize and effectively achieve their goals, thus improving team performance. In addition, team processes mediated the relation between collective efficacy and team performance perceptions. Teams who were efficacious used more team processes and may have recalled these processes when rating how they well they thought they performed. Teams may use the amount of team processes they engaged in as an indicator of how well they perceived they performed, with more processes being indicative of higher performance.

Moreover, team processes were positively related to team satisfaction. Teams who engaged in more team processes were more satisfied with their team. This aligns with meta analytic research which has shown support for a positive relation between team processes and team satisfaction (LePine et al., 2008). Team processes involve creating a positive social environment which may help improve satisfaction within the team. Additionally, team processes mediated the relation between collective efficacy and team satisfaction. Teams who were

efficacious were more satisfied. Evidence suggests this is because they are motivated to engage in processes which may make people feel successful. Interpersonal processes also most likely boost this feeling of being satisfied as these processes involve enhancing motivation, regulating affect, and instilling confidence. Thus, team members would associate positive experiences with their team and feel more satisfied.

Strengths & Limitations

The present study does have several limitations. Previous research has used multiple measures of performance including a measure of performance behaviour and a performance outcome measure (Rapp et al., 2014). Thus, other sources of performance data could be collected in addition to grades to get a better picture of performance. The present study did use a subjective measure of team performance, team performance perceptions. However, team members may not have the most accurate perceptions of how successfully their team performed on the task. Another limitation of the current study was the use of a student sample. The sample was quite homogeneous, and the projects only required students to work together for a brief period of time. However, work teams can be quite diverse and can require teams to work together for extended periods of time. Thus, the use of a student sample limited the generalizability of the findings. Finally, the results of the present study should be interpreted with caution as statistical power was not reached.

Despite the limitations, the present study had several strengths. Both objective and subjective performance data was collected. For the objective measure, the grades were assigned by teaching assistants using a standardized grading rubric. The methodology also strengthened the robustness of the findings, as there was temporal separation of the collective efficacy and team outcome measures. The temporal separation was based on meaningful increments.

Collective efficacy was measured early enough so that it was not heavily influenced by the team processes or any team feedback. Team processes was also measured before teams received grades to prevent this data from being influenced by performance data. Finally, the study was able to examine teams who had not previously worked together. The collective efficacy of teams in the study was thus not contaminated by feedback from previous projects or assignments. Therefore, the present study was able to discern the impact of collective efficacy on processes and team outcomes within newly formed working teams.

Future Directions

This study not only helps to provide further knowledge to a robust body of literature but also acts as a stepping stone for future areas of research. Firstly, future research should further explore the relation between collective efficacy and team satisfaction. Only a handful of articles have investigated or speculated about the relation between collective efficacy and team satisfaction (Bandura, 1997; DeRue et al., 2010; Ilgen et al., 2005; Luu & Narayan, 2017). Early findings have indicated that greater collective efficacy is related to higher team satisfaction (Luu & Narayan, 2017). However, future research could aim to replicate results or even to explore this relation further by examining moderating variables, such as task interdependence. Higher task interdependence could potentially strengthen the relation between collective efficacy and satisfaction as interdependence increases interpersonal interactions and could make the team environment more salient to members (DeRue et al., 2010). Understanding this relation further could help researchers make better informed recommendations with regards to bolstering team satisfaction in the workplace.

Furthermore, the dispersion of collective efficacy within teams should be examined in future research. Team efficacy scores are typically aggregated team member scores and most

researchers are concerned with ensuring that team members agree with each other (DeRue et al., 2010). However, recent theory posits that there are different forms of efficacy dispersion and that the way in which team members vary in their efficacy beliefs can be meaningful (DeRue et al., 2010). DeRue et al. (2010) asserted that the distinct forms of efficacy could impact team performance differently. Thus, future research could examine how and why different types of efficacy dispersion form in teams and the impact of dispersion on team outcomes.

Finally, future research could examine the impact of collective efficacy on these team outcomes longitudinally. The IMO (input-mediator-output-input) model asserts that outputs could influence inputs over time (Ilgen et al., 2005). Thus, team performance and satisfaction could influence a team's efficacy over time. Future research could examine how team efficacy as well as performance and satisfaction changes over multiple projects and after receiving performance feedback. This would bring greater understanding to how this relationship evolves over time and would provide more knowledge of feedback loops within teams.

Implications

This study contributes to the existing body of literature on collective efficacy in work teams (e.g. Bandura, 1997; Gully et al., 2002; Stajkovic et al., 2009). The latest research on collective efficacy has alluded to a more complex relationship between collective efficacy and team performance (Chen & Lee, 2007; Goncalo et al., 2010; Katz-Navon & Erez, 2005, Rapp et al., 2014). Theory on efficacy-performing spirals posits that higher levels of team performance may lead to declines in team performance due to complacency or overconfidence (Lindsley et al., 1995). However, trends from the current study do not align with this theory and suggest that a linear relationship may best describe the relation between collective efficacy and team performance. This supports elements of social cognitive theory, that assert that more collective

efficacy leads to higher performance as collective efficacy instills motivation essential to complete tasks successfully (Bandura, 1997).

In addition, this study suggests empirical evidence for a relationship between collective efficacy and team satisfaction, demonstrating the beneficial impact of team efficacy on satisfaction. Furthermore, this study suggests empirical evidence for team processes as an explanatory mechanism between collective efficacy and team outcomes. Overall, the findings help expand the knowledge and surrounding literature of collective efficacy.

The study also has a consequential impact for the practice side of I-O psychology. This study illustrates the benefits of higher collective efficacy in teams and how higher efficacy impacts the processes these teams are engaging in. This is helpful for practitioners aiming to improve team performance and satisfaction as the study indicates where they can intervene and influence these team outcomes. Specifically, practitioners can create interventions to bolster collective efficacy. Practitioners can also teach and emphasize the importance of engaging in vital team processes to improve team outcomes. Transition processes, such as planning, and strategizing could be taught before the project begins to ensure teams are prepared to begin the project. Action processes, such as team monitoring, and interpersonal processes, such as confidence building, could be taught during the project as these are important to use throughout a project. Thus, the current study will be impactful for practitioners interested in optimizing team performance and increasing team satisfaction.

Conclusion

Overall, this study provides evidence of the benefits of collective efficacy on team processes and outcomes. More collective efficacy in a work team can lead to greater engagement in team processes which in turn influences how a team performs and how satisfied members are

with the team. A curvilinear relation between collective efficacy and team performance was not found suggesting that this may be an isolated or conditional phenomenon. Team processes was found to be a novel mediator of collective efficacy and team outcomes. Team satisfaction was also found to be a relatively novel outcome of collective efficacy. In conclusion, collective efficacy is beneficial for organizations to foster within their work teams and researchers should continue to explore the impact of collective efficacy on team outcomes.

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Table 1. Psychology sample descriptive statistics

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Collective Efficacy	5.97	0.53	(0.88)				
2. Team Processes	4.03	0.35	.52** [.32, .67]	(0.96)			
3. Team Performance Perceptions	6.20	0.41	.51** [.31, .66]	.74** [.61, .83]	(0.92)		
4. Grades	77.37	8.55	.12 [-.12, .34]	.09 [-.15, .32]	.21 [-.03, .42]		
5. Team Satisfaction	6.26	0.56	.60** [.42, .73]	.68** [.54, .79]	.60** [.43, .73]	.03 [-.20, .26]	(0.88)
6. Age	19.92	2.53	.00 [-.23, .23]	-.13 [-.35, .10]	.05 [-.18, .28]	-.01 [-.25, .22]	-.17 [-.38, .07]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$. Cronbach's alphas for measures are on the diagonal in parentheses.

Table 2. Business sample descriptive statistics

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Collective Efficacy	5.19	0.41	(0.86)				
2. Team Processes	3.72	0.18	.28*	(0.91)			
			[.02, .51]				
3. Team Performance Perceptions	5.83	0.35	.32*	.71**	(0.87)		
			[.06, .54]	[.55, .82]			
4. Grades	74.64	7.98	-.12	.02	-.03		
			[-.37, .15]	[-.25, .28]	[-.29, .24]		
5. Team Satisfaction	5.64	0.40	.27*	.58**	.70**	-.06	(0.82)
			[.00, .50]	[.38, .74]	[.54, .82]	[-.32, .21]	
6. Age	18.74	0.85	.10	-.12	-.07	.05	-.10
			[-.17, .35]	[-.37, .15]	[-.33, .20]	[-.22, .31]	[-.36, .17]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$. Cronbach's alphas for measures are on the diagonal in parentheses.

Table 3. ICC(1) and ICC(2) values of psychology and business samples for collective efficacy, team processes, team performance perceptions, and team satisfaction

	Psychology sample		Business sample	
	ICC(1)	ICC(2)	ICC(1)	ICC(2)
Collective Efficacy	.24	.47	0.05	0.23
Team Processes	.35	.58	0.01	0.06
Team Performance Perceptions	.14	.29	0.03	0.14
Team Satisfaction	.21	.40	0.02	0.13

Table 4. Summary of hypothesis testing results for psychology and business samples

	Hypotheses supported	
	Psychology sample	Business sample
H1(a): Collective efficacy will be positively related to team performance.	Grades: Not supported Performance perceptions: Supported	Grades: Not supported Performance perceptions: Supported
H1(b): The relation between collective efficacy and team performance will have a negative quadratic trend, such that the relation between collective efficacy and team performance will attenuate for higher values of collective efficacy.	Grades: Not supported Performance perceptions: Not supported	Grades: Not supported Performance perceptions: Not supported
H2(a): Collective efficacy will be positively related to team processes.	Supported	Supported
H2(b): The relation between collective efficacy and team processes will have a negative quadratic trend, such that the relation between collective efficacy and team processes will attenuate for higher values of collective efficacy.	Not supported	Not supported
H3: Team processes will be positively related to team performance.	Grades: Not supported Performance perceptions: Supported	Grades: Not supported Performance perceptions: Supported
H4: Team processes will partially mediate the relation between collective efficacy and team performance.	Grades: Not supported Performance perceptions: Supported	Grades: Not supported Performance perceptions: Supported

H5: Collective efficacy will be positively related to team satisfaction.	Supported	Supported
H6: Team processes will be positively related to team satisfaction.	Supported	Supported
H7: Team processes partially mediate a relation between collective efficacy and team satisfaction.	Supported	Supported

Table 5. Regression results for psychology sample using team grade as the criterion

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	-31.91	[-208.71, 144.88]		
Collective Efficacy	36.07	[-25.25, 97.40]	2.22	[-1.55, 5.98]
Collective Efficacy Quadratic	-2.95	[-8.25, 2.34]	-2.10	[-5.87, 1.67]
Team Processes	2.14	[-3.65, 7.93]	0.09	[-0.15, 0.33]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

Table 6. Regression results for psychology sample using team performance perceptions as the criterion

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	3.82**	[2.85, 4.79]		
Collective Efficacy	0.40**	[0.24, 0.56]	0.51	[0.30, 0.72]
Collective Efficacy Quadratic	-0.05	[-0.27, 0.17]	-0.71	[-4.00, 2.58]
Team Processes	0.85**	[0.67, 1.04]	0.74	[0.57, 0.90]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

Table 7. Regression results for psychology sample using team satisfaction as the criterion

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	0.90	[-0.29, 2.09]		
Collective Efficacy	0.63**	[0.43, 0.84]	0.60	[0.40, 0.79]
Team Processes	1.08**	[0.80, 1.36]	0.68	[0.51, 0.86]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

Table 8. Regression results for business sample using team grade as the criterion

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	-41.77	[-289.45, 205.92]		
Collective Efficacy	47.54	[-48.19, 143.28]	2.46	[-2.49, 7.41]
Collective Efficacy Quadratic	-4.81	[-14.03, 4.41]	-2.58	[-7.54, 2.37]
Team Processes	0.81	[-11.36, 12.97]	0.02	[-0.26, 0.29]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

Table 9. Regression results for business sample using team performance perceptions as the criterion

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	4.41*	[3.27, 5.55]		
Collective Efficacy	0.27*	[0.05, 0.49]	0.32	[0.06, 0.58]
Collective Efficacy Quadratic	-0.20	[-0.58, 0.18]	-2.49	[-7.21, 2.23]
Team Processes	1.37**	[1.00, 1.74]	0.71	[0.52, 0.91]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

Table 10. *Regression results for business sample using team satisfaction as the criterion*

Predictor	<i>b</i>	<i>b</i> 95% CI [LL, UL]	<i>beta</i>	<i>beta</i> 95% CI [LL, UL]
(Intercept)	4.30**	[2.97, 5.64]		
Collective Efficacy	0.26*	[0.00, 0.51]	0.27	[0.00, 0.53]
Team Processes	1.29**	[0.79, 1.78]	0.58	[0.36, 0.81]

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .05$. ** indicates $p < .01$.

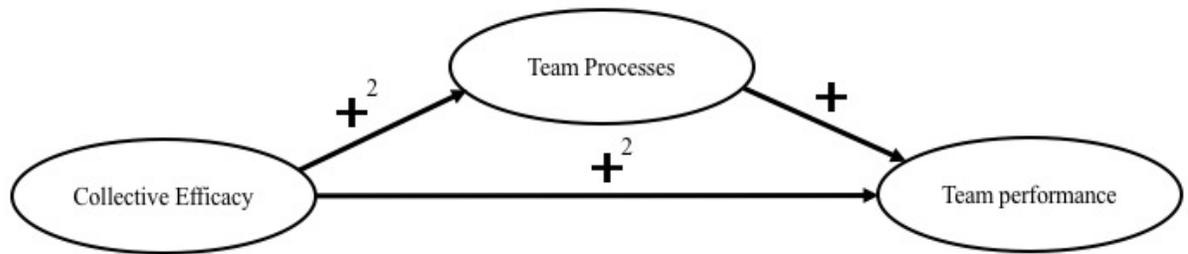


Figure 1. Collective efficacy and team performance mediation model.

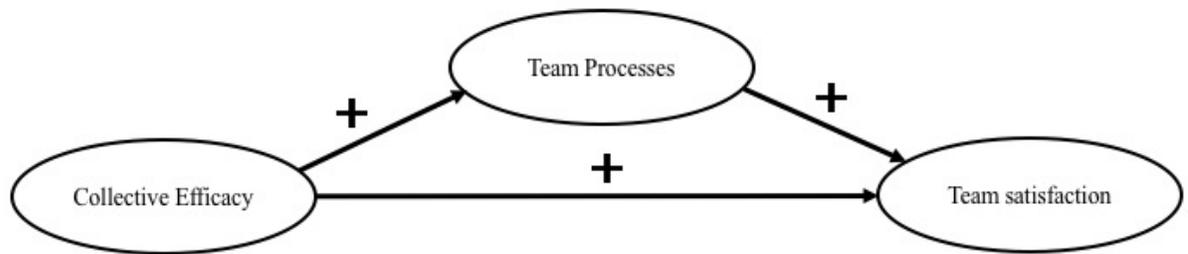


Figure 2. Collective efficacy and team satisfaction mediation model.

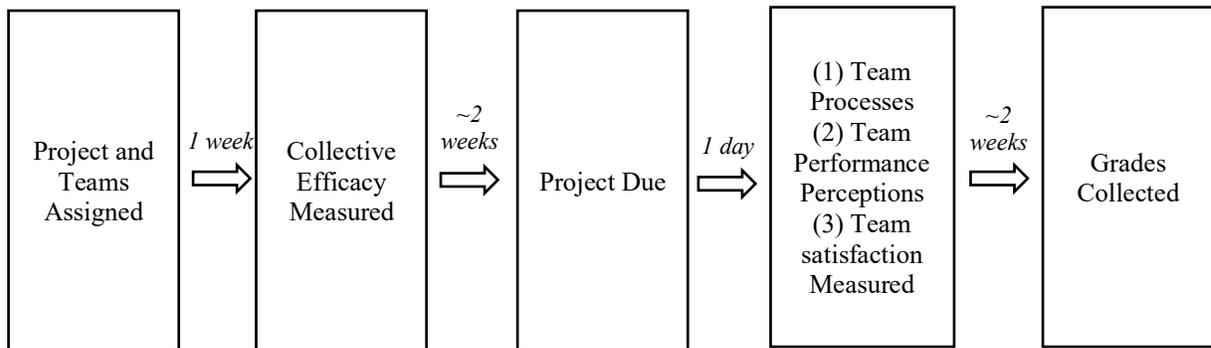


Figure 3. Procedure of study.

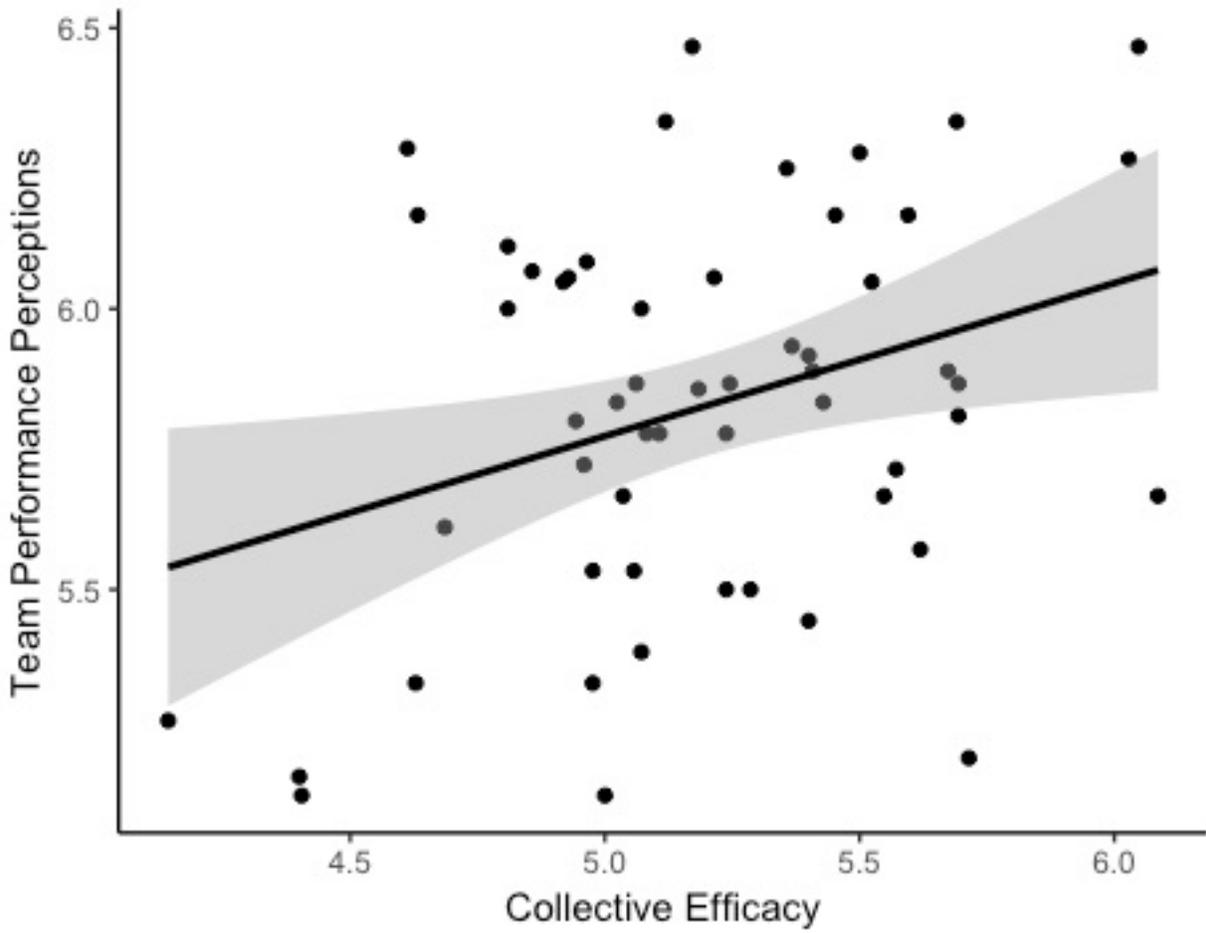


Figure 5. Collective efficacy and team performance perceptions scatterplot for business sample.

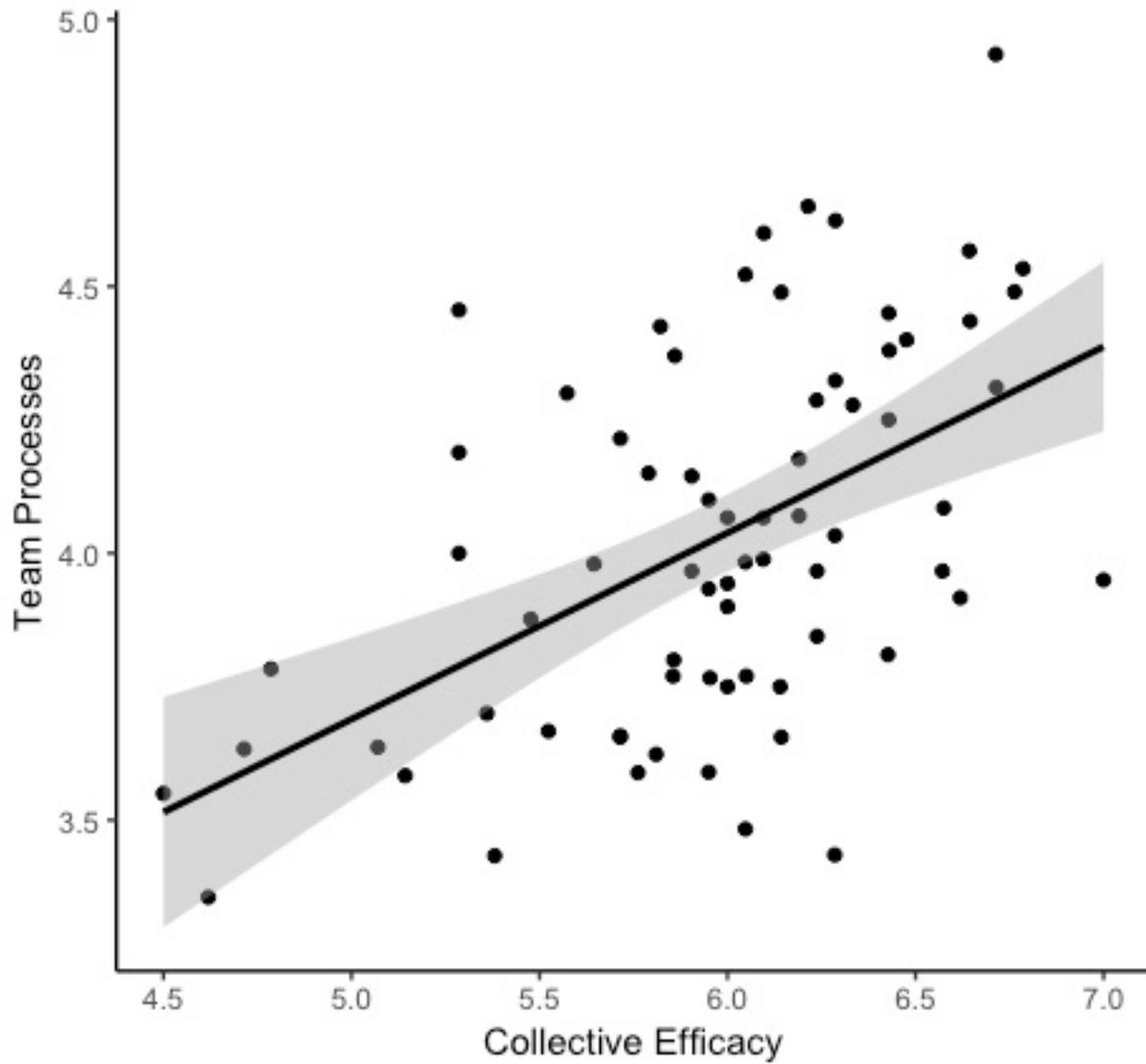


Figure 6. Collective efficacy and team processes scatterplot for psychology sample.

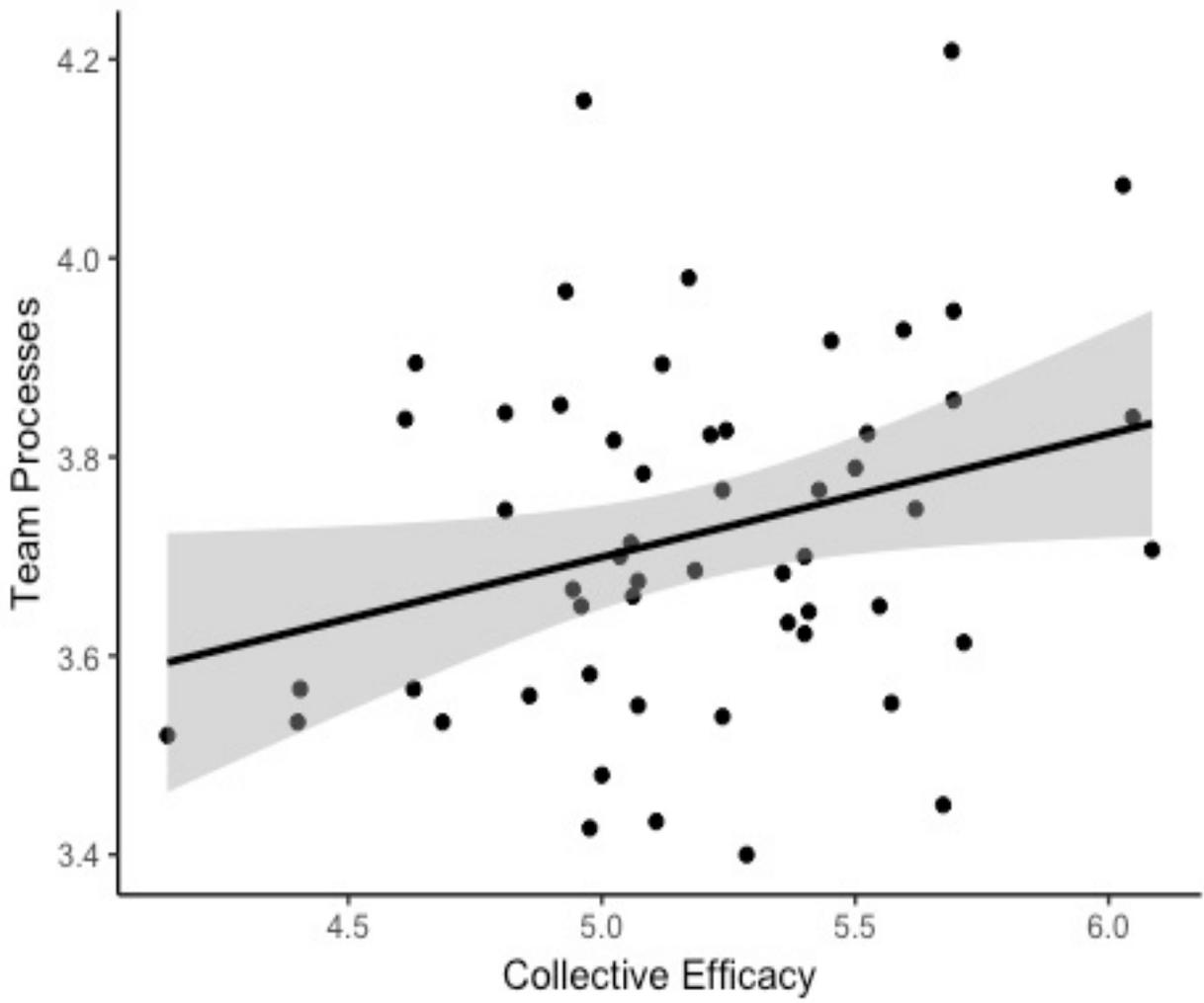


Figure 7. Collective efficacy and team processes scatterplot for business sample.

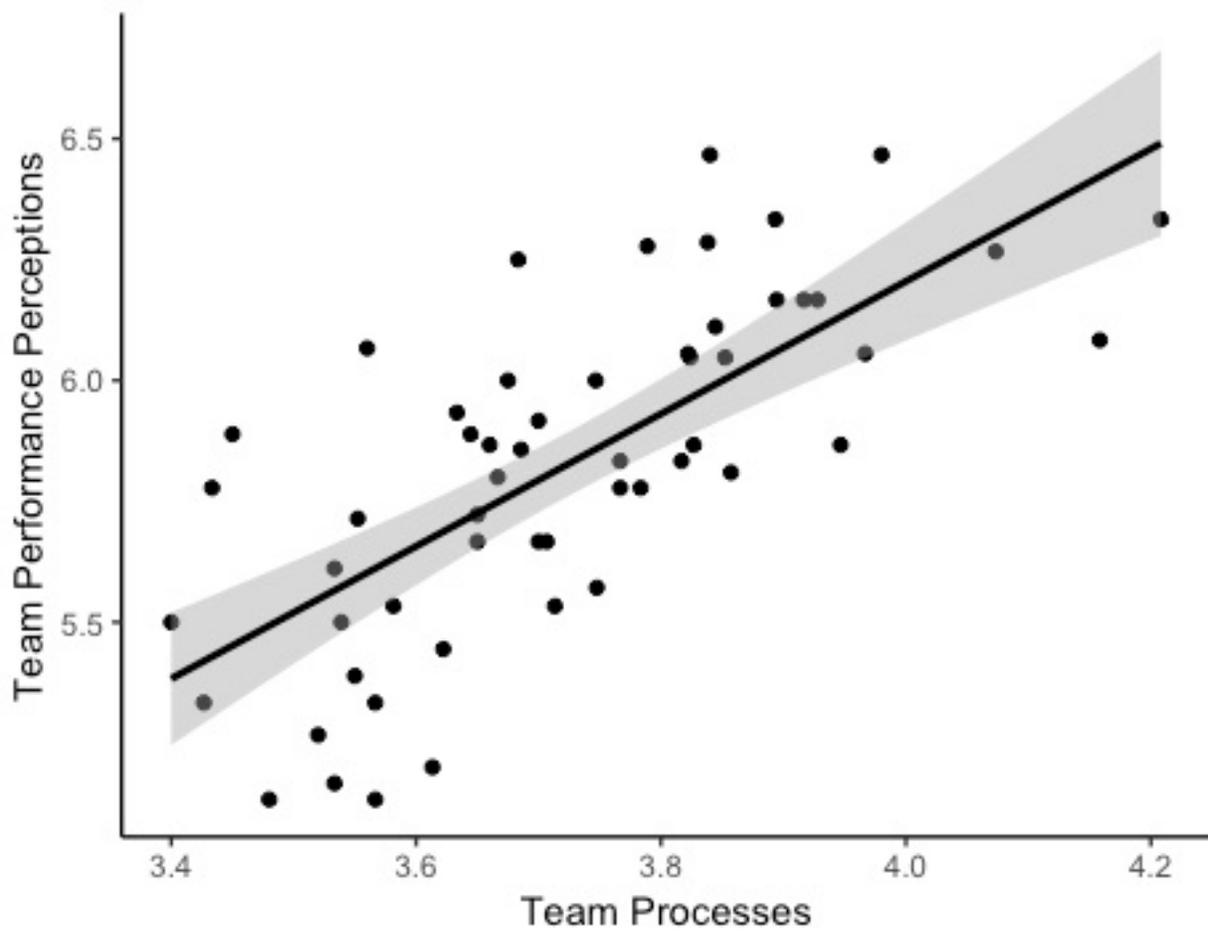


Figure 9. Team processes and team performance perceptions scatterplot for business sample.

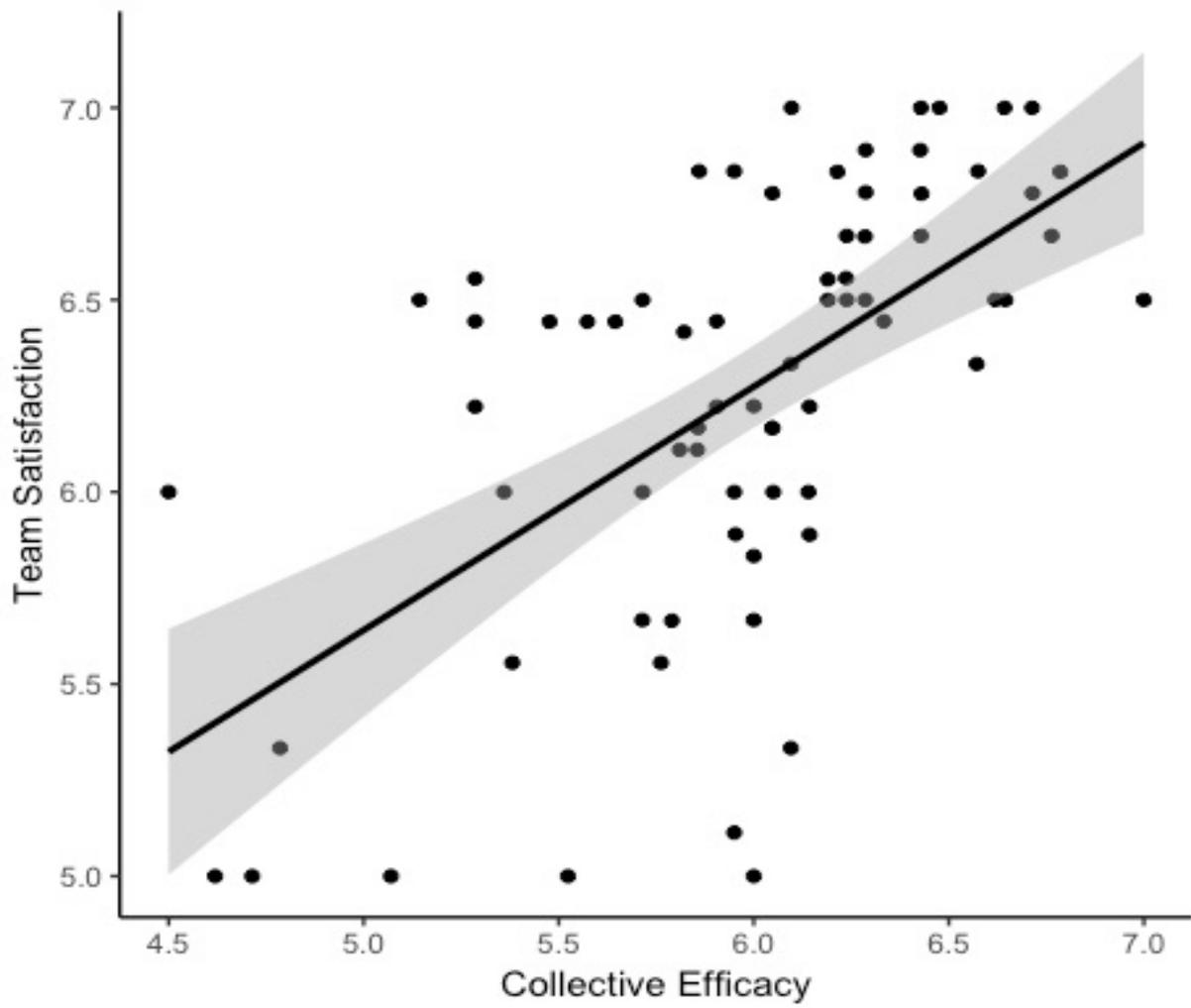


Figure 10. Collective efficacy and team satisfaction scatterplot for psychology sample.

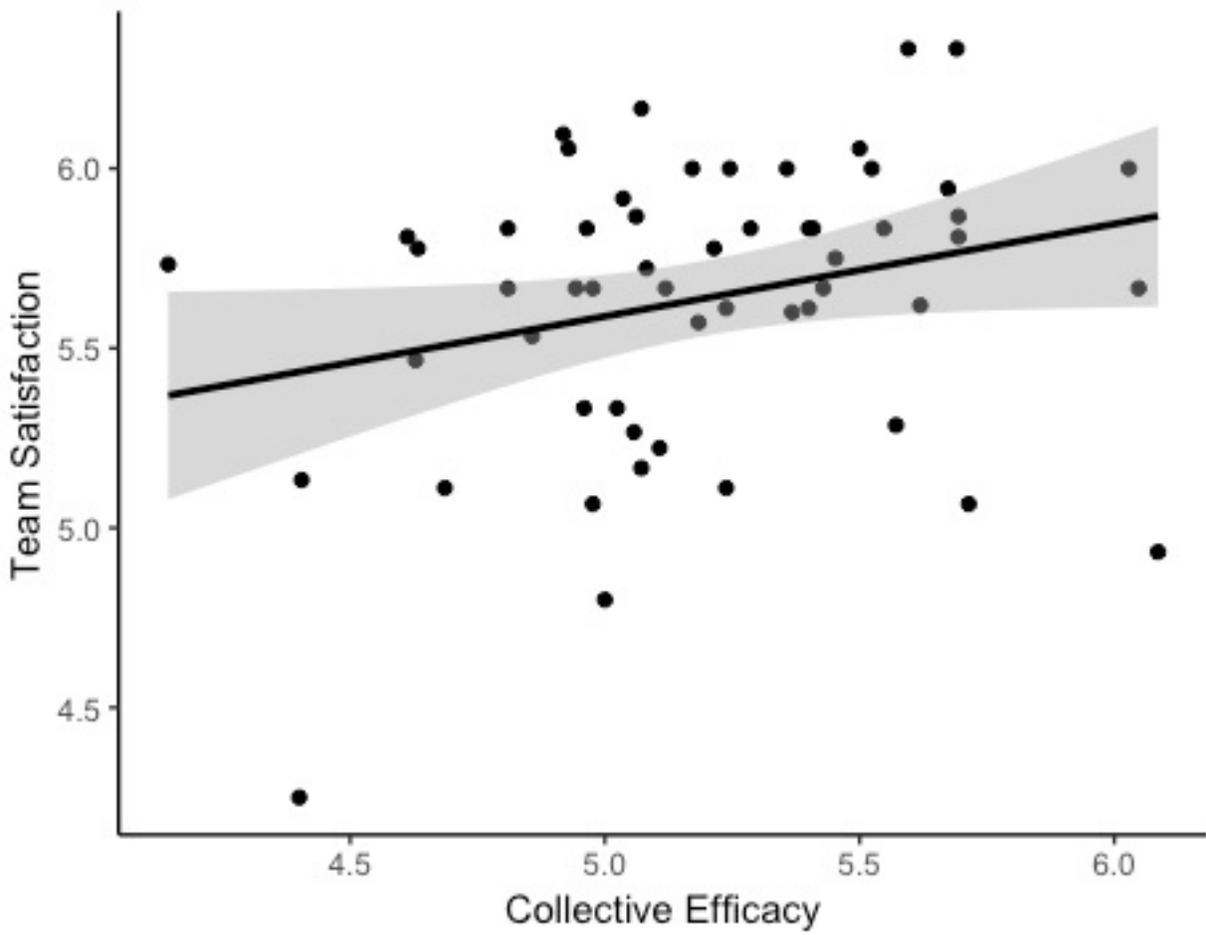


Figure 11. Collective efficacy and team satisfaction scatterplot for business sample.

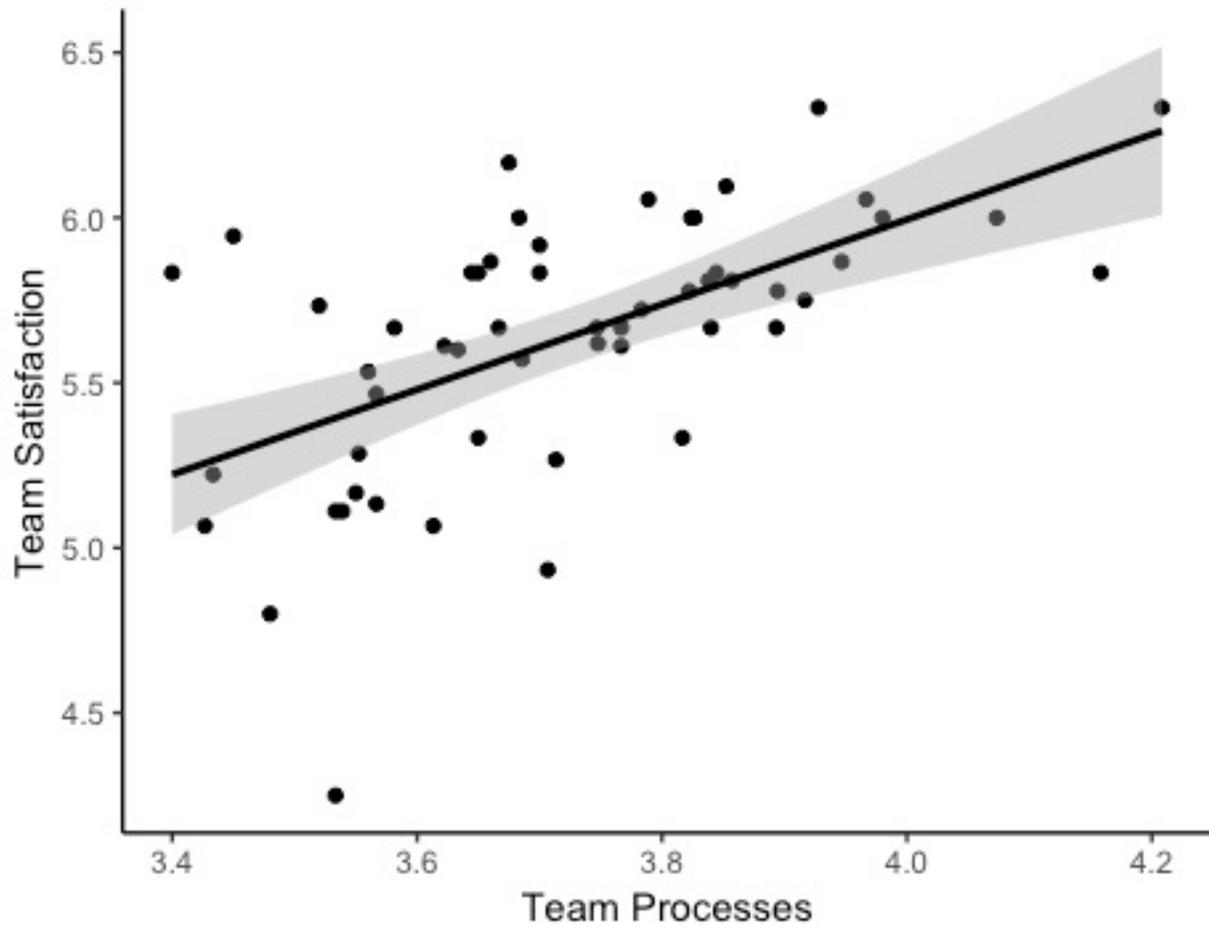


Figure 13. Team processes and team satisfaction scatterplot for business sample.

Appendix A

Collective Efficacy Beliefs Scale

Think about the team to which you have been assigned. When responding to the following items, answer in reference to this group's work-related ability. Respond with "SA" for "strongly agree," "A" for "agree," "AS" for "agree somewhat," "DS" for "disagree somewhat," "D" for "disagree," and "SD" for "strongly disagree."

- I. The team I work with has above average ability.
- *2. This team is poor compared to other teams doing similar work.
- *3. This team is not able to perform as well as it should.
4. The members of this team have excellent academic skills.
- *5. Some members of this team should be removed due to lack of ability.
- *6. This team is not very effective.
- *7. Some members in this team cannot do their jobs well.

Appendix B

Team Processes Scale

Transition Processes

To what extent does our team actively work to

- 1= Not at all
- 2= Very Little
- 3= To Some Extent
- 4= To a Great Extent
- 5= To a Very Great Extent

Mission Analysis

- *1. Identify our main tasks?
- *2. Identify the key challenges that we expect to face?
- *3. Determine the resources that we need to be successful?

Goal Specification

- *1. Set goals for the team?
- *2. Ensure that everyone on our team clearly understands our goals?
- *3. Link our goals with the strategic direction of the team?

Strategy Formulation & Planning

- *1. Develop an overall strategy to guide our team activities?
- *2. Prepare contingency (“if-then”) plans to deal with uncertain situations?
- *3. Know when to stick with a given working plan, and when to adopt a different one?

Action Processes

To what extent does our team actively work to

- 1= Not at all
- 2= Very Little
- 3= To Some Extent
- 4= To a Great Extent
- 5= To a Very Great Extent

Monitoring Progress Toward Goals

- *1 Regularly monitor how well we are meeting our team goals?
- *2. Use clearly defined metrics to assess our progress? (e.g., grades, time goals)
- *3. Seek timely feedback from stakeholders (e.g teaching assistants, professors) about how well we are meeting our goals?

Resource and Systems Monitoring

- *1. Monitor and manage our resources (e.g., financial, equipment, etc.)?
- *2. Monitor important aspects of our work environment (e.g., inventories, equipment and process operations, information flows)?
- *3. Monitor events and conditions outside the team that influence our operations?

Team Monitoring and Backup

- *1. Develop standards for acceptable team member performance?
- *2. Balance the workload among our team members?
- *3. Assist each other when help is needed?

Coordination

- *1. Communicate well with each other?
- *2. Smoothly integrate our work efforts?
- *3. Coordinate our activities with one another?

Interpersonal Processes

To what extent does our team actively work to

1= Not at all

2= Very Little

3= To Some Extent

4= To a Great Extent

5= To a Very Great Extent

Conflict Management

- *1. Deal with personal conflicts in fair and equitable ways?
- *2. Show respect for one another?
- *3. Maintain group harmony?

Motivating & Confidence Building

- *1. Take pride in our accomplishments?
- *2. Develop confidence in our team's ability to perform well?
- *3. Encourage each other to perform our very best?

Affect Management

- *1. Share a sense of togetherness and cohesion?
- *2. Manage stress?
- *3. Keep a good emotional balance in the team?

* Indicates items for short form.

Appendix C
Team Performance Perceptions Scale

Please rate the extent to which the following statements apply to your PSYC*2070 team. Respond with "SA" for "strongly agree," "A" for "agree," "AS" for "agree somewhat," "DS" for "disagree somewhat," "D" for "disagree," and "SD" for "strongly disagree."

- 1) The work outputs of this team are highly successful.
- 2) This team delivers high-quality work.
- 3) This team achieves its goals

Appendix D

Team Satisfaction Scale

Please rate the extent to which the following statements apply to your PSYC*2070 team. Respond with "SA" for "strongly agree," "A" for "agree," "AS" for "agree somewhat," "DS" for "disagree somewhat," "D" for "disagree," and "SD" for "strongly disagree."

- 1) All in all, everyone in the team is satisfied with the team.
- 2) In general, team members do not like the team. (R)
- 3) In general, team members like working in this team.

Appendix E

Demographics Questionnaire

My age is:

_____ Years

Prefer not to disclose

What is your gender?:

Woman

Man

My gender identity is not listed above: _____

Choose not to respond

Which of the following BEST describes your ethnic background? Please CHECK ALL THAT APPLY :

Indigenous (Inuit/First Nations/Métis)

White/European

Black/African/Caribbean

Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino, etc)

Arab (Saudi Arabian, Palestinian, Iraqi, etc)

South Asian (East Indian, Sri Lankan, etc)

Latin American (Costa Rican, Guatemalan, Brazilian, Columbian, etc)

West Asian (Iranian, Afghani, etc)

Other (please specify)

My major is:

I am presently enrolled in PSYC*2070: Teams, Leadership, and Professional Behaviour

Yes

No

How many people are in your team? _____

Appendix F

The Danger of Excessive Collective Efficacy: When and How Team Confidence Hinders Performance

The use of work teams is becoming more prevalent as organizations are stepping away from the traditional hierarchical structure (Devine, Clayton, Philips, Dunford, & Melner, 1999). According to Deloitte's 2016 Global Human Capital Trend report, organizations are now structuring themselves as a "network of teams" to ensure agility and to better meet customer needs (Bersin, Geller, Wakefield, & Walsh, 2016). As many as 92% of organizations value redesign and are seeking to implement adaptable teams in lieu of a formal hierarchy (McDowell, Agarwell, Miller, Okamoto, & Page, 2016). With this influx of structural change, it is imperative to consider how teams impact the organization.

One critical aspect to consider when assessing the impact of teams in the workplace is how they perform and the key drivers of this performance. Research on team performance is abundant. Team performance is linked to numerous antecedents including team cohesion, the composition of teams and the levels of trust within teams (Bell, Villado, Lukasik, Belau, & Briggs, 2011; De Jong, Dirks, & Gillespie, 2016; Mach, Dolan, & Tzafrir, 2010; Stewart, 2006). Further, trust in the team's ability is vital in determining team performance (Bandura, 1997). Teams confidence in their abilities influences the amount of effort they expend and their motivation (Bandura, 1997). Meta-analytic evidence has found collective efficacy, a team members' shared belief in the ability of their team to successfully accomplish a task, to be a key determinant of team performance (see Gully, Incalcaterra, Joshi, & Beaubien, 2002; Stajkovic, Lee, & Nyberg, 2009).

Despite these meta-analytic findings, the nature of the relationship between collective efficacy and team performance has recently undergone scrutiny (Chen & Lee, 2007; Goncalo, Polman, & Maslach, 2010; Katz-Navon & Erez, 2005). Recent findings indicate that too much collective efficacy can have a negative effect on teams (Goncalo, et al., 2010; Park, Kim, & Gully, 2017; Rapp, Bachrach, Rapp, & Mullins, 2014; Tasa & Whyte, 2005). Very high collective efficacy may be impacting the processes that teams are engaging in and ultimately their performance (e.g., Tasa & Whyte, 2005).

Furthermore, team satisfaction is another variable to consider when reviewing how collective efficacy impacts teams in the workplace. Collective efficacy has the power to influence the emotions of team members (DeRue, Hollenbeck, Ilgen, & Feltz, 2010). These emotions can be positive or negative and may impact the members feelings of satisfaction. Team satisfaction can impact the physical and psychological health of team members (Sonnentag, 1996), and further, satisfaction can influence the development of the team (Hackman, 1987; Sundstrom, De Meuse, & Futrell, 1990). Therefore, the purpose of this study is to assess how collective efficacy impacts team processes which in turn impact team performance and team satisfaction.

Input-Process-Output Model

The input-process-output (IPO) framework is widely used to understand team dynamics and their outcomes (e.g., Antoni & Hertel, 2009). Steiner (1972) and McGrath (1984) originally used IPO models as a systems model to understand how inputs and processes relate to team performance. Inputs are team level variables. Inputs can be psychosocial traits or emergent states (Cohen & Bailey, 1997; McGrath, 1984; Steiner, 1972). Inputs, such as cohesion or team attitudes, influence processes. Processes are behavioural, cognitive, or verbal acts that teams

engage in. Processes mediate the relationship between inputs and outputs (Marks, Mathieu, & Zaccarto, 2001; McGrath, 1984; Steiner, 1972). Outputs are the outcome of the input and processes. Outputs are often measured as team effectiveness or performance (McGrath, 1984; Steiner, 1972). In summary, inputs affect processes which affect outcomes, and processes mediate the relationship between inputs and outcomes (McGrath, 1984; Steiner, 1972). In this study, I will use the IPO framework to examine how the input of collective efficacy impacts team processes and how they ultimately influence the outputs of team performance and team satisfaction.

Collective Efficacy in Teams

Collective efficacy is a facet of social cognitive theory (Bandura, 1982). Social cognitive theory asserts that learning is a result of an individual's socialization (Bandura, 1977). Individuals observe environmental cues and social interactions to learn how to behave. This observational learning is reciprocal as the person, their behaviour, and the environment interact and influence each other (Bandura, 1977). For instance, a person's behaviour can be either negatively or positively reinforced by the environment they are in, thus impacting the likelihood of the person engaging in that behaviour again. People will engage in behaviours that are positively reinforced and thus gravitate to tasks they believe they will be successful in (Bandura; 1982). People interpret their observations and form beliefs regarding their ability to successfully complete a task. These beliefs form one's perceived self-efficacy for the task (Bandura, 1982; Bandura, 1997).

Self-efficacy is an individual level construct however Bandura (1997) extended this concept to the group level. Collective efficacy is defined as "a group's belief in their conjoint capabilities to organize and execute the courses of action required to produce given level of

attainments” (Bandura, 1997, p. 477). It is important to distinguish the concepts of (individual) self-efficacy and collective efficacy as they are two quantitatively distinct constructs. Collective efficacy is solely focused on the team’s capabilities and is not measured by how confident an individual is in themselves or in another team member but rather every member’s confidence in the whole group. Therefore, collective efficacy is a team-level construct.

Moreover, collective efficacy is an emergent property (Bandura, 1997). Collective efficacy beliefs are the perceptions of individuals regarding the team’s abilities. These perceptions are aggregated to the group level creating an emergent property. Therefore, teams with the same skills, abilities, and knowledge can have different levels of collective efficacy (Campion, Medsker, & Higgs, 1993; Early, 1993). These levels of efficacy can change depending on the environment, how the team interacts, and the processes they engage in. Additionally, Bandura (1997) theorized that collective efficacy can influence team processes including planning and strategy processes, as well as a team’s goals, resource management, and resiliency (Bandura, 1997).

Efficacy beliefs formulate as soon as teams are created, and a task is present. Team members make judgements of how the team will complete the task during the initial group interactions (Gersick, 1988). Once teams learn more about the members and the task at hand collective efficacy beliefs may change to fit this perception of the team’s capabilities (Gibson, 1999). Evidently, information sharing in teams is vital to collective efficacy perceptions. However, information sharing may be inhibited or biased (Goodman, Ravlin, & Schminke, 1990) thus complicating a group’s perception of their efficacy. Therefore, collective efficacy beliefs form quickly but are subject to change and can be coloured by the information most salient to the members.

Several other factors also influence collective efficacy beliefs. Prior team performance can impact the current efficacy beliefs as teams who perform lower in the past are likely to have lower efficacy beliefs and vice versa (Durham, et al., 2009; Feltz & Lirgg, 1998). Further, teams who receive training prior to a task are more likely to have higher collective efficacy (Gibson, 2001). Individual level efficacy beliefs also influence collective efficacy. Team members self-efficacy beliefs are positively related to the team's efficacy beliefs (Fernandez-Ballesteros, Diez-Nicolas, Caprara, Barbaranelli, & Bandura, 2002). Finally, time constraints can cause stress and pressure on teams and thus negatively impacts team efficacy (Durham, Locke, Poon, & McLeod, 2009). Therefore, there are an abundance of antecedents to collective efficacy in teams.

Furthermore, it is important to differentiate between collective efficacy and group potency. These two constructs are both group-level constructs that focus on the team's capability beliefs. Literature often portrays collective efficacy and group potency as synonymous constructs (Jung & Sosik, 2003). However, group potency is a general belief in the team's capabilities (Guzzo, 1993). Potency is a broader construct, whereas collective efficacy is task specific (Bandura, 1997). Findings have proven group potency and collective efficacy to be related but distinct constructs (e.g., Collins & Parker, 2010). In addition to being related to each other, collective efficacy and group potency are related to team performance (Stajkovic, et al., 2009). However, collective efficacy fully mediates the relationship between potency and performance (Stajkovic, et al., 2009). Therefore, the current study focuses solely on collective efficacy.

Collective Efficacy and Team Performance

Literature demonstrates that collective efficacy is a motivating factor for teams and ultimately a contributor to team performance (Goncalo, et al., 2010). Collective efficacy in teams has the power to motivate members and provide direction for effort (Fuller, Hardin, & Davidson,

2007). If the members of a team believe in the ability of the team to effectively execute tasks then the team will work harder, collaborate as a team, and have more positive interactions (Bandura, 1997; Lindsley, Brass, & Thomas, 1995). Furthermore, teams with high collective efficacy are more likely to trust and communicate with other members and engage in process behaviours relevant to accomplishing the goals of the group (DeRue, et al., 2010). Meta-analytic evidence demonstrates a moderate positive relationship between collective efficacy and team performance (Gully et al., 2002; Stajkovic et al., 2009).

However, several studies are inconsistent with the positive meta-analytic results, suggesting there may be underlying complexities to the relationship between collective efficacy and team performance. Studies have reported no relationship or a negative relationship between collective efficacy and team performance (e.g., Chen & Lee, 2007; Goncalo, et al., 2010; Katz-Navon, & Erez, 2005). The relationship between collective efficacy and team performance is also contingent on the characteristics of the task assigned. Task uncertainty impacts the efficacy-performance relationship, as some research has illustrated that collective efficacy is not related to performance when teams were given tasks with greater uncertainty (Gibson, 1999). These findings appear to be counterintuitive to the argument that higher collective efficacy is beneficial and indicate under some circumstances collective efficacy may not impact or may even harm team performance.

Researchers have also theorized that collective efficacy may not always help team performance. Very high collective efficacy could lead to overconfidence and greater probability of risk-taking behaviour, complacency, and lack of attention (Gist, 1987; Knight, Durham, & Locke, 2001; Lindsley et al., 1995; Whyte, 1998). If team members are overconfident they may take inapt risks with decision making and harm team performance (Audia, Locke, & Smith,

2000). Further, very high collective efficacy could lead teams to disregard negative feedback and maintain commitment to maladaptive plans of action (Whyte, 1998). Very high efficacy beliefs that spiral upward may reduce learning opportunities and inhibit performance (Lindsley et al., 1995; Whyte, 1998). Consequently, too much collective efficacy may harm teams.

In response to concerns surrounding the possible ill-effects of too much collective efficacy, some researchers have proposed that collective efficacy may have a curvilinear relationship with beneficial team outcomes (e.g., Rapp, et al., 2014; Tasa & Whyte, 2005). An empirical laboratory study found support for a curvilinear relationship between collective efficacy and vigilant problem solving in teams (Tasa & Whyte, 2005). Teams with higher levels of collective efficacy had a reduced frequency of systematic decision-making procedures when compared to teams with moderate levels of collective efficacy (Tasa & Whyte, 2005). Consequently, higher efficacy teams made lower quality decisions (Tasa & Whyte, 2005). This study provided initial empirical evidence into the dangers of too much collective efficacy.

Subsequently, two studies emerged that looked directly at the relationship between collective efficacy and team performance and asserted that a curvilinear model fit best (Park, et al., 2017; Rapp, et al., 2014). Rapp et al. (2014) found support for a curvilinear relationship between collective efficacy and team performance. They argued that collective efficacy is advantageous until a certain point, after which greater efficacy lead to detrimental effects for team performance (Rapp et al., 2014). The overconfidence from too much collective efficacy could lead to inability to recognize flaws in processes and groups may have too much faith in the proficiencies of members (Chou, Lin, & Chou, 2012; Rapp et al., 2014). A subsequent study also found support for a curvilinear relationship between collective efficacy and team performance in work teams at an electronics company (Park et al., 2017). Collective efficacy had a positive

effect on team performance until a point of inflection at which the positive impact of efficacy on performance began to wane (Park et al., 2017). Given these recent developments in the relationship between collective efficacy and team performance, I aim to find further support for a non-linear relationship. The first part of the initial hypothesis predicts a linear relationship solely because one must statistically account for the linear trend before testing for the quadratic trend. Therefore, I hypothesize the following:

H1a: Collective efficacy will be positively related to team performance.

H1b: The relation between collective efficacy and team performance will have a negative quadratic trend, such that the relation between collective efficacy and team performance will attenuate for higher values of collective efficacy.

It is evident that collective efficacy does have some impact on team performance. However, given the evolving change in the view of this relationship it is important to concretely establish the mechanism through which collective efficacy impacts team performance. In past research, the relationship between these two variables has been explained by the motivation behind collective efficacy (Bandura, 1997). Groups who have higher collective efficacy are more motivated to perform well because they have the belief that their group can achieve their goal and that success is realistic for the group (Bandura, 1997). However, motivation is only one aspect of the relationship between collective efficacy and team performance. Motivation does not elucidate the specific behaviours and processes engaged in by high and low efficacy teams. Therefore, it is important to examine what processes teams are engaging in and if these processes impact their team performance.

Team Processes

To further understand the relationship between collective efficacy and team performance it is vital to look at the processes that the team members utilize. Team processes are defined as “members interdependent acts that convert input to outcomes through cognitive, verbal, and behavioural activities, directed toward organizing task work to achieve collective goals” (Marks, Mathieu, & Zaccaro, 2001, p. 357). Marks et al. (2001) categorize team processes into three dimensions, including transition, action, and interpersonal processes. These dimensions are subsumed under the higher order construct, team processes, as they all describe different forms of team interaction throughout the process of accomplishing goals (Marks et al., 2001).

The first dimension, transition processes, are processes that take place in the beginning of a project when teams are formulating how they will accomplish the task (Marks et al., 2001). There are three processes in this phase, mission analysis, goal specification, and strategy formulation and planning. Mission analysis is the team’s evaluation of the task, resources, and environment for the given situation (Marks, et al., 2001). This process allows teams to reflect on any obstacles the team may face and to establish a shared vision of objectives. Goal specification is the team’s identification of the targets they aim to achieve (Marks, et al., 2001). Teams can specify main and sub goals and denote expectations of timelines and quality. Strategy formulation and planning is the team’s creation of the figurative blueprint for the task (Marks, et al., 2001). Teams set expectations of roles and how the team will complete the task.

The second dimension, action processes, is focused on the methods which a team uses to achieve their goal. These processes include monitoring progress toward goals, systems monitoring, team monitoring and backup, and coordination (Marks, et al., 2001). Monitoring goal progress refers to the surveying of advancement towards the goals set and comparing team expectations to team behaviours (Marks, et al., 2001). Systems monitoring is the team’s

assessment of their resources and environmental conditions that are critical to completing the task (Marks, et al., 2001). Team monitoring refers to team members supporting other members of their team to help them complete their duties (Marks, et al., 2001). This could include a team member providing feedback or even completing some or all their team member's duties. Finally, coordination is the organization of the team's efforts and actions to achieve goals (Marks, et al., 2001).

The third dimension, interpersonal processes, is centered on the interactions between team members and includes conflict management, motivation and confidence building, and affect management (Marks, et al., 2001). Conflict management refers to the proactive or reactive team response to controlling and resolving any disagreements or interpersonal issues that arise in the team (Marks, et al., 2001). Motivation is the process by which members instill confidence in each other and elicit cohesion (Marks, et al., 2001). Affect management refers to the calibration and regulation of team members emotions while working to accomplish the task (Marks, et al., 2001).

According to the IPO model, team processes should affect team outcomes. Emergent states (inputs) such as collective efficacy impact team processes and then team processes influence team outcomes such as performance (Marks et al., 2001). In the literature, team processes have been positively related to team performance and effectiveness (e.g., Kozlowski & Ilgen, 2006; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). One meta-analysis that reviewed 138 studies positively linked all ten team processes and all three team process dimensions to team performance and member satisfaction (LePine, et al., 2008). Evidently, the process teams engage in influence team outcomes. Thus, understanding team processes is crucial to illuminating how team behaviour can impact team performance.

Collective Efficacy's Impact on Team Processes and Team Performance

Low collective efficacy teams, those who do not have high belief in their team's capabilities, are often associated with lower performance (e.g., Gully, et al., 2002). These teams lack confidence in themselves and do not believe that success is feasible (Bandura, 1997). This lack of confidence results in members who are less likely to engage in productive behaviours that could benefit their teams, such as planning and structuring (Bandura, 1997; Ilgen, Hollenbeck, Johnson, & Jundt, 2005; DeRue, Hollenbeck, Ilgen & Feltz, 2010). Evidently, low collective efficacy teams may have lower performance due to less engagement in team processes such as devising a plan, formulating a strategy, and monitoring behaviour (i.e. transition and action processes). Teams low in collective efficacy may not be engaging in these team processes because the team may feel powerless and that failure is inevitable (Tasa & Whyte, 2005). The team does not feel capable of achieving a desirable performance outcome and thus believes there is no reason to engage in effective processes to complete the task. Further, low collective efficacy may not only impact transition and action processes but also interpersonal processes. Low collective efficacy leads to an evocation of negative emotions and less engagement, thus reducing team's likelihood of trusting and bonding with each other (Bandura, 1997; Ilgen, et al., 2005). Consequently, low collective efficacy teams may be less likely to engage in interpersonal team processes such as conflict and affect management or motivation and confidence building. Therefore, teams low in collective efficacy may be engaging in less team processes and thus their team performance is suffering.

Further, teams with moderate amounts of collective efficacy may be engaging in the highest amount of team process behaviours as they believe themselves capable of completing objectives. A belief in the team's capabilities can lead to a healthy confidence that translates into

positive emotional interactions within the team and high engagement (DeRue, et al., 2010). Accordingly, moderate efficacy teams may engage in more interpersonal processes. These teams are also considered adaptable and adept at planning and structuring as well as setting appropriate goals (DeRue, et al., 2010). Moderate efficacy teams thus may engage in more transition and action processes. Consequently, moderate collective efficacy teams have an appropriate level of confidence that may result in a higher frequency of team processes and ultimately greater team performance.

Finally, teams who are very high in collective efficacy may be too overconfident and may not be engaging in as many team processes, thus explaining any lower performance. The recent findings that showcase a curvilinear trend between collective efficacy and team performance (e.g. Rapp, et al., 2014; Parks, et al., 2017) indicate that teams very high in collective efficacy are performing lower than previous finding would predict. This may be caused by a lack of engagement in vital team processes that would benefit the team and their performance. Teams very high in collective efficacy may set themselves up for failure as they engage in less adaptive behaviours that would benefit their team. For instance, when those who are successful become complacent with vital decision-making the likelihood of consequent failure heightens (Miller, 1994). Moreover, those with very high collective efficacy may be less responsive and less likely to adapt to feedback that can help them in future projects (Silver, Mitchell, & Gist, 1995). Thus, very high collective efficacy teams may not be engaging in as many transition and action processes, such as mission analysis, and systems monitoring. Further the probability of vigilant problem solving in a team may be reduced when a team has very high collective efficacy (Tasa & Whyte, 2005). Teams may be less likely to set goals, consider alternative approaches, and engage in risk management when efficacy is high (Tasa & Whyte, 2005). Hence, very high

collective efficacy teams may not be engaging in vital team processes such as formulating strategies or contingency plans which are essential transition and action processes. Again, because one must statistically account for the linear trend before the quadratic trend, I hypothesize the following:

H2a: Collective efficacy will be positively related to team processes.

H2b: The relation between collective efficacy and team processes will have a negative quadratic trend, such that the relation between collective efficacy and team processes will attenuate for higher values of collective efficacy.

Furthermore, team processes have been positively associated with team performance in previous findings (Marks, et al., 2001; Kozlowski & Ilgen, 2006; LePine, et al., 2008). Engaging in a greater frequency of team processes leads to higher performance. Transition processes ensure teams are focused and prepared to complete the task (Marks, et al., 2001). Action processes keep teams on track through monitoring behaviours that can proactively mitigate issues (Marks, et al., 2001). Interpersonal processes help to bolster team cohesion and reduce conflict (Marks, et al., 2001). Therefore, I hypothesize the following:

H3: Team processes will be positively related to team performance.

Moreover, I assert that the relationship between collective efficacy and team performance can be partially explained by team processes (see Figure 1). Collective efficacy may influence the amount of team processes engaged in and consequently impact team performance. This aligns with the IPO model as collective efficacy is an emergent state (Bandura, 1997) that is the input in the model. Collective efficacy then informs team processes, which mediates the relationship between team performance and collective efficacy. Therefore, I hypothesize the following:

H4: Team processes will partially mediate the relation between collective efficacy and team performance.

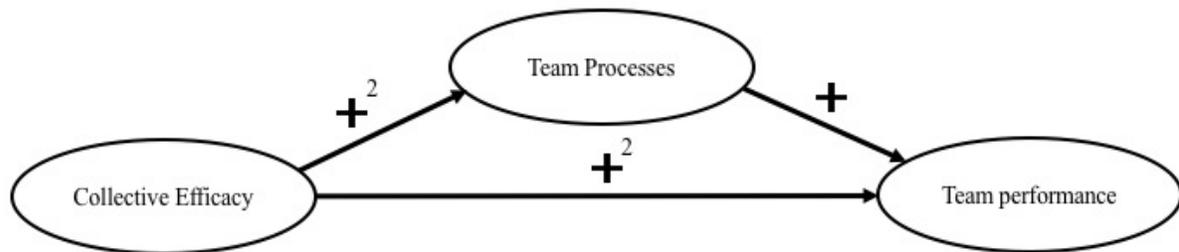


Figure 1. Collective efficacy and team performance mediation model.

Collective Efficacy and Team Satisfaction

Collective efficacy may not just affect a team's performance, it may also impact team satisfaction. An efficacious team develops a suitable level of team confidence. Team confidence leads to more positive emotional responses from the members towards the team (Bandura, 1997; DeRue, et al., 2010). These positive emotions may make team members feel more satisfied with their team as they associate their team with success. High efficacy teams may also have more trust within their team and stronger bonding (DeRue et al., 2010). These stronger relationships may also bolster feelings of team satisfaction. Conversely, low team efficacy elicits more negative emotions and teams have a collective feeling of helplessness (Bandura, 1997; DeRue et al., 2010; Ilgen et al., 2005). These adverse feelings associated with the team may reduce team member's feelings of satisfaction. A recent study has also shown a small positive relationship between collective efficacy and team performance (Luu & Narayan, 2017). Thus, the level of collective efficacy in a team may influence the team's satisfaction level. However, the

relationship between collective efficacy and team satisfaction has only recently been explored.

Due to the absence of research focused on collective efficacy and team satisfaction, I will examine this relationship using an exploratory hypothesis. Therefore, I will explore if:

H5^E: Collective efficacy will be positively related to team satisfaction.

Team Processes and Team Satisfaction

Previous literature has demonstrated a positive link between team processes and team satisfaction. Meta-analytic evidence reveals that team processes are positively related to member satisfaction, with each one of the ten team processes being significantly related to satisfaction (LePine et al., 2008). Transition and action processes, such as goal setting or coordination, provide structure and clarity to a team. In turn, these processes can bolster the team's cooperation and ultimately their satisfaction (Pinto, Pinto, & Prescott, 1993). Interpersonal processes influence team satisfaction as they focus on managing conflict and affect of team members as well as providing motivation and building member confidence (Marks et al., 2001). Therefore, I predict that collective efficacy and team processes will be positively related to team satisfaction.

H6: Team processes will be positively related to team satisfaction

Further, team processes may explain the relationship between collective efficacy and team satisfaction. Collective efficacy may impact a team's engagement in team processes which may ultimately influence the satisfaction of the team. Again, this logic follows the IPO model with collective efficacy as an input, team processes as a process, and team satisfaction as an outcome. Due to the lack of research surrounding the collective efficacy – team satisfaction relationship, I am proposing only partial mediation of team processes. Therefore, I will explore if:

H7^E: Team processes partially mediate a relation between collective efficacy and team satisfaction.