Journal of Occupational and Organizational Psychology (2010), in press

The British Psychological Society

www.bpsjournals.co.uk

Team capability beliefs over time: Distinguishing between team potency, team outcome efficacy, and team process efficacy

Catherine G. Collins[1]* and Sharon K. Parker[2]

[1]Australian School of Business, University of New South Wales, Sydney, Australia
[2]UWA Business School, University of Western Australia, Perth, Australia

Teams that have positive beliefs about their capability tend to perform more effectively. However, relatively little is known about the nature and change of different types of team capability beliefs. Team potency and team efficacy are two approaches to understanding team capability beliefs, but few studies have considered these beliefs simultaneously. We investigate their distinctiveness and relative predictive power. Additionally, we propose two types of team efficacy: team outcome efficacy and team process efficacy. In two longitudinal samples of executive MBA study teams (sample 1, $N = 213$ individuals in 41 teams; sample 2, $N = 360$ individuals in 89 teams), we showed that team potency, team outcome efficacy, and team process efficacy are factorially distinct and measure invariant at four time points over 7 months (except for high levels of team outcome efficacy for which factorial invariance emerged). We also show differential predictive validity. Team outcome efficacy was the strongest predictor of objective team performance, whereas team process efficacy was the best predictor of citizenship behaviours. Team potency predicted both outcomes, albeit more weakly. Collectively, the findings show the value of a more fine-grained approach to teams' capability beliefs, including a new validated measure of team process efficacy.

The growth in teamwork (Lawler & Mohrman, 2003) highlights the importance of understanding what helps teams to function effectively. Much research has focused on how team composition, processes, and the organizational context influence team effectiveness (e.g. Hackman, 1987). During the 1990s, research expanded to consider the role of teams' collective perceived capability of working together to achieve tasks. When this belief is domain specific (focusing on a specific task, or set of specific tasks), it is referred to as team efficacy (Bandura, 1997). When this belief is a global evaluation of team capability spanning many domains it is referred to as team potency (Guzzo, Yost, Campbell, & Shea, 1993). Team efficacy and team potency are predicted to increase

* *Correspondence should be addressed to Dr Catherine G. Collins, Australian School of Business, University of New South Wales, Sydney, NSW 2052, Australia (e-mail: c.g.collins@unsw.edu.au).*

DOI:10.1348/096317909X484271

performance because teams with a strong belief in their capabilities set higher goals, develop strategies to achieve their goals, and persist in the face of setbacks.

There is now solid evidence for the importance of these team beliefs. A meta-analysis of 67 studies showed moderate positive relationships of team efficacy and team potency ($\rho = .41$ and .37, respectively) with performance (Gully, Incalcaterra, Joshi, & Beaubien, 2002). Furthermore, in a study that focused on the relative importance of team potency compared to other antecedents of team effectiveness such as context, composition, job design, interdependence, and processes, potency was the strongest predictor of team performance (Campion, Medsker, & Higgs, 1993; Campion, Papper, & Medsker, 1996); team efficacy was not measured in this study.

The importance of team efficacy and team potency for performance has led scholars to theorize about, and empirically identify antecedents of these motivations. Gibson and Earley (2007) advocated a theoretical model, whilst other studies have sought to empirically identify key antecedents (Arthur, Bell, & Edwards, 2007; Chen *et al.*, 2002; Jung & Sosik, 2003; Tasa, Tagger, & Seijts, 2007). However, scholars have not yet fully unpacked the construct domain of team capability beliefs. This is a necessary step for the full value of the construct to be realized (Morgeson & Hofmann, 1999). As Gibson and Earley (2007) observed, it is 'critical for future operationalizations to capture the dynamic nature of group efficacy beliefs and provide adequate measures of group efficacy as it unfolds' (p. 453).

The overarching goal of the current paper is to identify and investigate different types of team capability beliefs and explore which type of change is appropriate to understand their dynamic nature. Drawing on social cognitive theory (Bandura, 1997) and the team effectiveness literatures (Mathieu, Maynard, Rapp, & Gilson, 2008), we distinguish team efficacy from team potency, and further differentiate two types of team efficacy: team outcome efficacy and team process efficacy. Whilst a few studies show differences between team efficacy and team potency (Gibson, Randel, & Earley, 2000; Gully *et al.*, 2002), most studies focus on just one type of team capability belief. After demonstrating that the three team capability beliefs are distinct, we explore their dynamic nature. Currently, empirical papers that explore antecedents to change in team capability beliefs assume that mean-level change (referred to as alpha change) is appropriate (Arthur *et al.*, 2007; Feltz & Lirgg, 1998; Jung & Sosik, 2003; Tasa *et al.*, 2007). However, before making this assumption, other types of more fundamental change that concern the meaning of the construct need to be ruled out (Golembiewski, Billingsley, & Yeager, 1976); we explore these different types of change.

Distinctiveness of team capability beliefs

Teams develop collective beliefs of their capability from team members' common exposure to similar situations, enactive mastery experiences, and prior performance (Bandura, 1997). As noted by Lindsley, Brass, and Thomas (1995), teams also compare and discuss team outcomes, which give rise to shared beliefs about team capabilities.

Two broad types of team beliefs have been the focus in the literature: team potency and team efficacy. Both constructs refer to a team's emergent belief in their capacity to be an effective team. Sometimes the terms are used interchangeably (Jung & Sosik, 2003). However, there are important theoretical differences between these concepts relating to the specificity of their focus (Gibson *et al.*, 2000; Gully *et al.*, 2002; Mathieu *et al.*, 2008). Team potency is general in emphasis, referring to 'the collective belief in a team that it can be effective' (Guzzo *et al.*, 1993, p. 87). It is a global evaluation regarding

the team's confidence in its general capability (an illustrative item is 'My team has confidence in itself'). Team efficacy, in contrast, is concerned with a team's confidence that it can carry out a specific task or set of specific tasks within a particular domain (Bandura, 1997). Team efficacy is similar to individual-level constructs like role breadth self-efficacy (Parker, 1998), which focus on individuals' beliefs of their capability to carry out particular tasks, whereas team potency has parallels with the individual concept of generalized self-efficacy. Thus far, few studies have considered team efficacy and team potency at the same time, so we know little about their empirical similarities or differences (for exceptions, see Gibson *et al.*, 2000; Gully *et al.*, 2002; Lee, Tinsley, & Bobko, 2002).

We further distinguish team efficacy to identify two particular domains that we propose are important for different aspects of team effectiveness: team outcome efficacy and team process efficacy. This distinction between outcome and process domains of team efficacy has been theoretically advocated (Mischel & Northcraft, 1997), but to our knowledge has not been explored empirically.

Team outcome efficacy refers to the team's collective beliefs about their capability to achieve team performance. These beliefs can focus on the quantity of outputs (e.g. number of programming tasks completed by a software engineering team) and/or the quality of outputs (e.g. whether the software meets customer requirements). Team outcome efficacy is critical for fulfilling the core reason why the team is working together; to perform the team task. Prior performance as individuals and initial team performance are expected to be sources of information that create team outcome efficacy beliefs.

To produce these team outcomes, members need to work together, and it is from this interdependent interaction that efficacy emerges about the team processes. Through their common experience and reflections about their interactions, teams develop consensual beliefs about their ability to work collectively, that is, their team process efficacy. As Zaccaro, Blair, Peterson, and Zazanis (1995) suggested, teams develop capability beliefs that extend beyond accomplishing the team task to also include 'how well group members can coordinate and combine their resources' (p. 311). These beliefs of capability about team processes are likely to emerge from the moment a team starts working together. This is in line with Gersick (1988) who argued that initial interactions amongst team members provide a lasting source of information about how members work together. Marks, Mathieu, and Zaccaro (2001) also argue that processes at different stages of the task cycle (transition, action, and interpersonal) impact behaviour. Drawing on these team development and team effectiveness literatures, we define team process efficacy as a team's belief about their capability to work together as a collective on processes across the entire life-span, from establishing team goals to coordinating team tasks, and managing interpersonal relationships.

Team outcome efficacy and team process efficacy are proposed to be distinct from each other because they focus on different capabilities. Although there are many possible types of team efficacy that could be identified,[1] we believe these broad domains are the most important. It reflects the well-established theoretical divide between

[1] *For example, Gibson* et al. *(2000) explored several specific constructs that come under the umbrella of team outcome efficacy, such as efficacy about the team solution, the time to complete the task, and the effectiveness of the solution. Likewise some researchers have focused on individual processes such as team efficacy for dealing with conflict (Alper, Tjosvold, & Law, 2000), whereas we see this as just one of several important processes that make up team process efficacy.*

'taskwork' and 'teamwork' (McIntryre & Salas, 1995). Moreover, it parallels the individual-level literature on self-efficacy, which is relevant because like other scholars (Chen, Mathieu, & Bliese, 2004; Gibson *et al.*, 2000; Gully *et al.*, 2002; Guzzo *et al.*, 1993), we conceptualize team efficacy as a team-level construct with a referent-shift composition model. Referent-shift constructs refer to the same construct at two different levels; the basic content of the construct and theory remain the same, but the referent changes, in this case from the individual level (self-efficacy) to the team level (team efficacy). For referent-shift constructs, it is appropriate to apply theory from lower to higher levels (Chan, 1998a). In the more established individual-level literature, there is a distinction between outcome and process self-efficacy (Mone, 1994; Wood & Locke, 1987). Outcome self-efficacy refers to beliefs about attaining accuracy, quality and/or the quantity of performance. Process self-efficacy refers to 'judgments that individuals make concerning their abilities to orchestrate sub-skills necessary for performance' (Mone, 1994, p. 517). We suggest this outcome – process distinction applies at the team level, although the belief content needs to be relevant to the collective rather than just individual members. Thus, team outcome efficacy focuses on team performance, whereas team process efficacy focuses on team members' capability to work together in a sustainable way.

In sum, we identify team potency, team outcome efficacy, and team process efficacy as three key types of team capability beliefs. To our knowledge, these three types of team efficacy have not been investigated concurrently, and thus have not been established as distinct constructs. Based on the above reasoning, we hypothesize:

> *Hypothesis 1:* Team potency, team outcome efficacy, and team process efficacy are distinct team-level constructs.

As well as differentiating the three dimensions to team capability beliefs, we aim to investigate their association with key team effectiveness outcomes. We consider team task performance, which is an obvious and well-established indicator of team effectiveness. We assess team performance in the current context (teams of MBA students) with team grades. However, focusing on team task performance as a sole indicator of team effectiveness can be overly narrow. As Tjosvold, Hui, Ding, and Hu (2003, p. 72) argued, 'much like an organization, the effectiveness of a group depends not only on the prescribed behavior of its members, but also on extra-role behavior, such as their organizational citizenship behavior'. Consistent with these longer-term views of team effectiveness, and other studies of team effectiveness (e.g. Ehrhart & Naumann, 2004), we include citizenship as a further important effectiveness outcome. When team members engage in citizenship behaviour, the team is likely to be sustainable in the longer term and provide an environment conducive to learning. By considering both team performance and team citizenship, our research is in line with the team effectiveness literature that considers an effective team as one that is both performing its core tasks well and functioning in a positive way (Hackman, 1987; Mathieu *et al.*, 2008).

Two broad principles underpin our predictions regarding how team capability beliefs influence team effectiveness outcomes. First, we expect that, by virtue of being more specific in their focus, team outcome efficacy and team process efficacy will be the best predictors of team performance and team citizenship, respectively. This argument about specificity (Epstein, 1979) is analogous to the personality theory about bandwidth; stronger relationships occur when there is a match between narrower traits with specific outcomes, and broader traits with general outcomes

(Barrick, Mount, & Judge, 2001). Similar conclusions about the bandwidth of team efficacy have been theorized (Bandura, 1997; Guzzo *et al.*, 1993), but not empirically investigated.

The second principle underpinning our predictions is that team capability beliefs influence behaviour via the same broad mechanisms, although the particular behaviour they influence depends on the focus of the capability belief. Thus, teams with stronger beliefs of their capability engage in goal setting, persist over time, adopt more flexible task strategies, and put in more effort (Bandura, 1997; Gully *et al.*, 2002; Lindsley *et al.*, 1995). However, the focus of the capability belief determines the target of these goals, persistence, strategies, and effort. We elaborate these arguments in relation to team performance and team citizenship next.

We propose that team outcome efficacy will be the most important predictor of team performance. Teams with high team outcome efficacy are likely to set challenging performance goals (Bandura, 1997; Gully *et al.*, 2002). In the current context of project teams working on cognitive tasks, higher goals for performance will encourage the team to put effort into identifying appropriate information, making arguments that support their project solution, and spur team persistence when difficulties arise, such as being overwhelmed by the amount of information that can inform team solutions. Thus, the team will have more cognitive resources to maximize knowledge and learning, so are more likely to have a thoroughly thought-through solution, and perform more effectively.

We also expect that team potency will predict team performance, albeit explaining less variance. There is evidence that global constructs such as team potency are more associated with affective rather than cognitive evaluation (Dutton & Brown, 1997). Thus, when a team has high team potency, their upbeat energy will, according to Fredrickson's (2001) broaden and build theory of emotions, enable team members to think expansively, and so the team is likely to strategize, set goals, and persist through setbacks to achieve the team task (Guzzo *et al.*, 1993). With the broad bandwidth, team potency's relationships with dependent variables of a narrow bandwidth are expected to be weaker than for the specific team efficacy constructs.

Team process efficacy is also likely to explain a small amount of variance in team performance. Team process efficacy will drive more strategizing effort and persistence to implement effective team processes such as identifying how to efficiently coordinate information flow, debate ideas, and reduce interpersonal conflict. There is a long history of team processes benefiting team performance (Marks *et al.*, 2001). However, we do not expect team process efficacy will explain a large proportion of variance in performance because this set of relationships is more distal than team outcome efficacy. Consistent with this expectation, a study with sport teams did not find a link between team process efficacy and team performance (Chen *et al.*, 2002).

> *Hypothesis 2:* Team outcome efficacy, team potency, and team process efficacy will positively predict team performance, with team outcome efficacy accounting for more variance in team performance.

For team citizenship, we propose that the strongest predictor will be team process efficacy, followed by team potency. When a team has high team process efficacy, members will set and follow through on challenging goals for how they work together. As such, teams with higher confidence in their team processes will be more likely to identify opportunities for and, in turn, implement citizenship. In addition, behaving as

a good citizen is not always easy; it often involves putting aside one's own interests for the sake of others. Teams who have a clearer belief in their capability to operate collectively are likely to perceive that their citizenship will be reciprocated; they will be more likely to perceive long-term benefits of providing support and will fear less that their efforts will be wasted due to dysfunctional team processes. Therefore, we propose that teams with high process efficacy will engage in more team citizenship.

Team potency is also expected to play a role in citizenship. When members who are generally efficacious work together, this global positive energy within a team is likely to foster an environment in which members will engage in citizenship behaviours as assisting one another is less risky when members are generally upbeat. However, team potency is a global evaluation with a broad bandwidth, so it is expected to have a weaker relationship with citizenship than team process efficacy.

We do not expect team outcome efficacy to make a unique contribution to team citizenship. Teams can be efficacious to produce outcomes and still not feel capable of working well together. For example, team outcome efficacy might manifest itself by members behaving in a competitive manner that builds performance through cognitive conflict, but at the same time reduces the team's interpersonal capacity. A meta-analysis showed that cognitive conflict positively relates to interpersonal conflict (DeDreu & Weingart, 2003), which supports the idea that capability for taskwork (team outcome efficacy) and teamwork (team process efficacy) do not always go hand-in-hand.

> *Hypothesis 3:* Team process efficacy and team potency will positively predict team citizenship behaviour; the former will account for more variance in citizenship than the latter.

Type of change in team capability beliefs

The second aim of our paper is to investigate the type of change that each team capability belief undergoes. Team capability beliefs are proposed by social cognitive theory to be dynamic states, changing between low and high mean levels as the team gathers feedback from working together and completing tasks (Bandura, 1997; Lindsley *et al.*, 1995). To date, only a few empirical studies (e.g. Arthur *et al.*, 2007; Feltz & Lirgg, 1998; Jung & Sosik, 2003; Lester, Meglino, & Korsgaard, 2002; Pescosolido, 2003; Tasa *et al.*, 2007) have examined the development of mean level team capability beliefs across two or more time points; this is referred to as 'alpha change' (Golembiewski *et al.*, 1976). Consistent with social cognitive theory (Bandura, 1997; Lindsley *et al.*, 1995; Molt *et al.*, 2000), we expect the mean levels of team capability beliefs to change over time. However, an important precursor to such studies of change is the need to rule out measure invariance; the possibility that there are more fundamental changes in the meaning and calibration of team capability beliefs over time. Measure invariance is also an important step in measure development (Chan, 1998b). To our knowledge, no studies to date have investigated measure invariance with team capability beliefs.

Configural invariance, also known as gamma change, is a change in the underlying meaning of the construct. Gamma change has been conceptualized as second-order change that occurs when the issue of interest is being perceived and classified differently (Vandenberg & Lance, 2009). In these situations, the construct of interest becomes more tightly connected or looser and less related. In empirical terms, more or fewer dimensions emerge from a factor analysis. For example, Bartunek and Franzak (1988) demonstrated gamma change with a change in factor structure in employee attitudes during an organizational restructure.

Gamma change in team capability beliefs will only emerge in contexts that lead team members to fundamentally rethink their perspectives on team effectiveness, such as if there is a significant change in the team's purpose or if there is a new team leader with very different effectiveness expectations. If a team's purpose changes, the structure of beliefs about working together effectively might also change, with the factor structure consolidating or becoming more fine-grained over time. As the participants in our studies work in teams where the purpose does not change, nor are there changes in team composition (see Method section), we expect the structure of team capability beliefs to remain stable over time; that is, gamma change is expected to be absent. We do not expect team members to reconceptualize the way they think about teams or to develop a fundamentally new perspective on team effectiveness over time.

Factorial invariance, also known as beta change refers to a recalibration, 'a stretching or shrinking on the measurement scale, rendering direct comparisons between absolute levels observed before and after the change problematic' (Chan, 1998b, p. 41). It is detected by change in item factor loadings. An illustrative situational change that has created beta change is when the standards change across primary, secondary, and tertiary schooling levels (Byrne, 1991). Over these schooling levels, baselines and points of comparison shift, making it difficult to make comparisons over time. Extending this, we may expect beta change to occur in team capability beliefs when there is a change in the standards about what it is to be effective. For example, members might be initially optimistic about what they can accomplish. However, over time, the complex logistics required for a team to be effective are revealed such that the team begins to shift how they would score themselves. In such a scenario, the measurement scale would stretch to accommodate tougher evaluations. Alternatively, the variability of the measurement scale might shrink when the capability beliefs are constrained by previous feedback, or lack of feedback. The participants in this study are familiar with the standards of tertiary education (see Methods section for details), thus we do not expect beta change in the team capability beliefs.

To strengthen our arguments, we also draw on gamma and beta change findings that have similarities to the context of this paper. Research on self efficacy conducted over a year, a similar length of time to this study, has demonstrated an absence of gamma and beta change (Dishman *et al.*, 2002; Molt *et al.*, 2000). Furthermore, longitudinal research in the context of tertiary education has found an absence of gamma and beta change in student performance (Pike, 1991). We therefore hypothesize:

Hypothesis 4: Team potency, team outcome efficacy, and team process efficacy will be configurally invariant (i.e. they will not demonstrate gamma change).

Hypothesis 5: Team potency, team outcome efficacy, and team process efficacy will be factorially invariant (i.e. they will not demonstrate beta change).

Method

Samples, research design, and procedure

Two samples of executives working full-time and completing their final year of a part-time executive MBA in Australia were utilized. Each sample was independent as participants were drawn from different student intakes. These participants worked in teams that ranged between four and six members; the average team size was 5.

Faculty assisted students to select their teams on the criteria of functional and gender diversity. These teams completed six case study assignments together across the year, which comprised 40% of the course assessment. Teams worked interdependently, typically meeting weekly for an hour, in addition to exchanging information via e-mail and phone. The teamwork was a major element of the course throughout the year; as shown by the considerable investment by both faculty and team members themselves in establishing and supporting teams.

Sample 1 drew on a sample of 213 managers in 41 study teams, with a 100% response rate. These participants completed two surveys equivalent to 'Times 1 and 2' in sample 2. Sample 2 used data collected from 500 managers in 98 study teams, collected across 2 years. Data were collected from the teams at four times. Each survey was administered just prior to, or during, the teams' four residential study blocks, which were major transition points for the teams.

The Time 1 survey was collected during the first week that teams worked together, during which they had undergone experiential learning exercises and started, but not finished, the first team assignment. At Time 2, teams had worked together for 7–8 weeks, thus completed their first assignment but had not yet received performance feedback, and had started work on their second assignment. At Time 3, teams had worked together for 18–20 weeks and had feedback on two team assignments. At Time 4, teams had worked together for 28–30 weeks, had feedback on four team assignments, with two more assignments still to complete. At each time point, there was a response rate of at least 72%, with a minimum of two survey responses from each team. The resulting dataset was 360 participants within 89 teams. After completing each survey, all teams received feedback from a coach on ways to enhance team performance and citizenship. The coaching intervention differed across the 2 years; we controlled for this with a dummy variable since it is not the focus of the paper.

Team demographics were similar in each sample. The average age within each team was 34.63 for sample 1 and 34.85 for sample 2 ($SD = 3$ and 2.87, respectively). Team membership was comprised of 73.67 and 70.75% ($SD = 2.87$, 2.11) males in samples 1 and 2, respectively. Each student had, on average, 8 years work experience from a minimum of one major functional area (accounting, finance, general management, human resources, information technology, marketing, production).

Measures

Surveys were completed by individuals, then aggregated to the team level (refer to Results section for justification). Established measures were used where possible, though we developed and validated a team process efficacy measure since one did not exist.

Team outcome efficacy was measured using Bandura's (2006) traditional scale format adapted to the context by focusing on the team assignment grade. The item stem, 'In your current team assignment, how confident are you that your team can achieve a grade of at least', was followed by 11 items of increasing challenge on performance accuracy, from '50%', '50–54%', then in 5% increments to 100%. Locke, Frederick, Bobko, and Lee (1984) demonstrated that 'self-efficacy strength estimates are most valid when they pertain to goals or levels of performance that are neither within the reach of all participants nor within the reach of none' (p. 248). To select our items in line with this recommendation, we conducted an exploratory factor analysis using maximum-likelihood (ML) extraction and oblimin rotation ($N = 41$) with the items from sample 1,

Time 1. This resulted in three factors with eigenvalues greater than 1. We constructed our measure using the items for 80–84%, 85–89%, 90–94%, and 95–100%; the cluster of items below this included the average team grade, thus was in the reach of most participants. So in line with the literature (Gibson *et al.*, 2000; Locke *et al.*, 1984), we constructed our measure on four items that represent moderate to high levels of performance difficulty.

Team process efficacy required a new measure to be developed since a validated measure did not exist. In line with Bandura (2006), we utilized the item stem to tap team motivation now rather than at a point in the future because 'it is easy for people to imagine themselves to be fully efficacious in some hypothetical future' (Bandura, 2006, p. 312–313). Thus, the item stem was 'How confident are you that your team could, if required, do each of these tasks right now?' This item stem is similar to team outcome efficacy measure, but the items differ. Items were generated deductively by the first author from the team process efficacy definition, with two guiding principles. First, items were generated according to Bandura's recommendations to tap specific tasks (i.e. team processes), and also included gradations of challenges in self-regulation required to achieve the tasks. Second, to ensure we covered the full gamut of the team processes, we drew on the theoretical framework from Marks *et al.*'s (2001). The resulting set of 32 items was then checked for content validity by the second author and an organizational behaviour PhD student. They selected a set of items that covered the theoretical definition of team process efficacy; the degree of agreement was 90%. The final item pool consisted of 10 items, which are listed in Table 1. A long and short version of the scale was used in samples 1 and 2, respectively. The procedure for measure development followed Hinkin's (1998) recommendations. After item generation (step 1), we then assessed the psychometrics in two independent samples to ensure the team process efficacy measure was not sample specific. With sample 1, exploratory factor analysis enables an initial test of Hypothesis 1, that the three team capability beliefs were distinct. From sample 1 we also created both long and short measures (steps 2 and 3 of Hinkin, 1998). Sample 2 used a separate, larger, longitudinal sample in which we tested: the distinctiveness of the three team efficacy beliefs with confirmatory factor analysis (CFA; Hypothesis 1); the discriminant predictive validity of the team efficacy constructs (Hypotheses 2 and 3); and measurement invariance (Hypotheses 4 and 5; fulfilling steps 4–6 of Hinkin, 1998).

Both team outcome efficacy and team process efficacy measures utilized an 11-point Likert scale that ranged from totally unconfident to totally confident (Bandura, 2006).

Team potency was assessed with Guzzo *et al.*'s (1993) measure. In several studies, this measure has been shown to be one-dimensional, reliable, and have sufficient inter-rater agreement (Guzzo *et al.*, 1993; Lester *et al.*, 2002). The Likert scale ranged from 'to no extent' (1), 'to a great extent' (5).

Team performance was the mark out of 100 for a team case study assignment completed in week 6. A subject expert faculty member graded all assignments based on depth of analysis, the presence of sufficient supporting material for arguments made, appropriateness of the solution, and timeliness. The performance grade and feedback was given to the team in week 9.

Team citizenship was an established measure (Podsakoff, Ahearne, & MacKenzie, 1997). An example item is, 'Members of my team help each other out if someone falls behind in their work'. The response scale ranged from 'strongly disagree' (1) to 'strongly agree' (5). Sufficient inter-rater agreement and team reliability justified aggregation to the team level (see Table 2).

Table 1. Factor loadings from exploratory factor analysis of team capability belief items (sample 1, $N = 41$ teams)[a]

Items	1	2	3
Team outcome efficacy			
90–94%[b]	.98		
95–100%	.96		
85–89%[b]	.87		
80–84%[b]	.79		
Team process efficacy			
Approach members who are overexerting or misusing their influence		.90	
Resolve conflicts that have become personalized[b]		.89	
Confront members who behave in unacceptable ways		.83	
Identify realistic goals that unify individual team member goals[b]		.81	
Listen with an open mind to team members ideas		.78	
Seek feedback on how well your team is performing		.69	
Actively help team members		.65	
Adapt to changing situations/demands[b]		.65	
Coordinate team members so they contribute their unique skills and abilities		.64	
Build positive morale among team members		.56	
Team potency			
This team believes it can become unusually good at producing high-quality work			.86
This team expects to be known as a high performing team[b]			.83
My team feels it can solve any problem it encounters			.71
My team has confidence in itself [b]			.71
My team believes it will get a lot done when it works hard			.68
No task is too tough for this team			.64
My team believes it can be very productive[b]			.62
My team expects to have a lot of influence in the classroom			.57
Eigenvalue	12.23	2.58	2.21
Variance explained	55.60	11.75	10.05

[a] Loadings $< .40$ are not presented here.
[b] These items were used for the short scale versions in samples 1 and 2.

As the three team capability beliefs and team citizenship were all self-report measures, we conducted exploratory factor analyses to ensure they were distinct, as indeed they were (results available from the authors).

Results

Psychometric properties of team capability beliefs: Hypothesis 1

Hypothesis 1 that there are three distinguishable types of team capability beliefs was investigated using exploratory factor analysis in sample 1 and a CFA in sample 2. As team capability beliefs are referent-shift constructs (see Introduction), factor analyses were conducted at the team level as recommended by Chen *et al.* (2004).

The exploratory factor analysis using ML extraction and oblimin rotation ($N = 41$) resulted in three factors with eigenvalues greater than 1 that together explained 77.40% of the variance. As expected, the three team capability beliefs factored separately. Table 1 lists the factor loadings.

Table 2. Cronbach alpha, r_{wg}, ICC(1), and ICC(2) statistics for team efficacy in both samples (1: $N = 41$; 2: $N = 89$) and citizenship in sample 2 ($N = 89$)

					ICC(1)			ICC(2)		
Variable	Measure	α	r_{wg} (mean)	r_{wg} (median)	Value	95% CI: Lower bound	95% CI: Upper bound	Value	95% CI: Lower bound	95% CI: Upper bound
TE outcome	Sample 1	.96	0.75	0.85	.15	.10	.21	.48	.42	.55
	Sample 2, Time 1	.96	0.74	0.80	.30	.26	.35	.69	.65	.72
	Sample 2, Time 2	.98	0.75	0.82	.23	.19	.27	.60	.56	.63
	Sample 2, Time 3	.96	0.76	0.87	.18	.14	.22	.53	.49	.57
	Sample 2, Time 4	.95	0.73	0.82	.20	.16	.24	.56	.52	.60
TE process	Sample 1, LM,	.96	0.97	0.97	.20	.14	.26	.57	.51	.62
	Sample 1, SM	.85	0.92	0.94	.19	.13	.25	.54	.48	.60
	Sample 2, SM, Time 1	.86	0.93	0.95	.20	.16	.24	.55	.51	.59
	Sample 2, SM, Time 2	.87	0.91	0.96	.16	.13	.20	.50	.46	.54
	Sample 2, SM, Time 3	.92	0.91	0.96	.18	.15	.22	.53	.49	.57
	Sample 2, SM, Time 4	.94	0.89	0.96	.32	.28	.36	.70	.67	.73
Team potency	Sample 1, LM	.93	0.99	0.99	.22	.16	.28	.60	.54	.65
	Sample 1, SM	.82	0.98	0.99	.23	.17	.29	.61	.55	.66
	Sample 2, SM, Time 1	.84	0.90	0.92	.26	.22	.30	.64	.60	.67
	Sample 2, SM, Time 2	.81	0.89	0.92	.22	.18	.26	.59	.55	.63
	Sample 2, SM, Time 3	.87	0.88	0.92	.34	.30	.38	.72	.69	.75
	Sample 2, SM, Time 4	.85	0.87	0.91	.36	.32	.41	.74	.71	.77
Team citizenship	Sample 2, Time 1	.87	0.89	0.92	.15	.11	.19	.47	.43	.51
	Sample 2, Time 2	.97	0.84	0.92	.30	.26	.34	.68	.65	.72

Note. TE, team efficacy; LM, long measure; SM, short measure.

Next, we investigated within-team agreement (r_{wg}) and aggregate reliability intraclass correlation coefficients (ICCs). As shown in Table 2, the mean and median of the r_{wg} statistics for each team efficacy dimension was $> .70$, providing sufficient evidence to justify aggregation of individuals' ratings to the team level (Chen *et al.*, 2004). Each team efficacy measure also demonstrated aggregate reliability. That is, the ICC(1) results demonstrate sufficient homogeneity within teams to justify aggregation to the team level via the mean, and the ICC(2)s highlight that these means can reliably differentiate teams. As illustrated in Table 2, each ICC statistic was within the bounds of a 95% confidence interval indicating that the constructs are appropriate to investigate at the team level (McGraw & Wong, 1996). These measures also demonstrated internal consistency. Cronbach alpha coefficients calculated at the team level were $> .80$. Therefore, all team capability belief items were aggregated into team-level measures.

Table 3 shows the descriptive statistics and correlations among the sample 1 variables. As shown, the team capability beliefs were moderately and positively correlated ($r = .44$ – $.69$). Importantly, the correlations were high between the long and short measures of team process efficacy ($r = .97$, $p < .01$) and team potency ($r = .96$, $p < .01$), highlighting the shorter measures are a good reflection of the longer scales.

Table 3. Descriptives and correlations among variables in sample 1 ($N = 41$ teams)

Variable	Mean	*SD*	1	2	3	4
1. Team outcome efficacy	4.03	1.33				
2. Team process efficacy – long scale	7.41	0.82	.51**			
3. Team process efficacy – short scale	7.23	0.93	.49**	.97**		
4. Team potency – long scale	3.64	0.40	.44**	.69**	.65**	
5. Team potency – short scale	3.80	0.44	.52**	.66**	.61**	.96**

**$p < .01$.

To further test Hypothesis 1, a CFA was conducted in sample 2 ($N = 89$) to assess the number of factors as well as the convergent and discriminant validities. To assess the fit of alternative models, we used the standardized root mean square residual (SRMR; Joreskog & Sorbom, 1988) and the comparative fit index (CFI; Hu & Bentler, 1998). When using ML methods, as was the case here, Hu and Bentler (1998) recommended using the SRMR, for which values of less than .05 are desired, but .08 are acceptable. They further recommended supplementing the SRMR with one of several indices, with CFI being especially appropriate for small sample sizes (< 250 cases). CFI values greater than .90 are considered a good fit. These fit statistics are illustrated in Table 4.

To assess the number of factors, we compared a series of nested models. The CFA comparison model was the three-factor model identified in sample 1: team outcome efficacy, team process efficacy, and team potency. This model was compared with four alternatives. Model 2 collapsed both team outcome efficacy and team process efficacy into one factor, which was differentiated from team potency. Model 3 compared the narrow outcome dimension, with a separate broader bandwidth factor that combined team process efficacy with team potency. Model 4 combined team outcome efficacy with team potency in one factor and kept team process efficacy distinct. Finally, a one-factor model was tested. The three-factor model was the best fit to the data at Time 1 ($\chi^2 = 44.10$, $df = 24$; CFI = .97; SRMR = .08), and was a better fit than any of the

Table 4. Comparison of alternative confirmatory factor structures of team capability beliefs in sample 2 ($N = 89$ teams)

Model	Description	χ^2	*df*	CFI	SRMR	$\Delta\chi^2$
1	Three factors: outcome, process, potency	44.10	24	.97	.08	M3 versus M1 = 66, $df = 2$, $p < .05$; M1 better
2	Two factors: specific (outcome and process) and potency	232.03	26	.78	.24	
3	Two factors: narrow (outcome) and broad (process and potency) bandwidth	110.10	26	.90	.12	
4	Two factors: outcome (outcome and potency) and process	160.16	26	.83	.71	
5	One factor: team efficacy (outcome, process, and potency)	334.04	27	.69	.25	

Note. The fit indices in this table are those for the team outcome efficacy variable without the item that created beta change. Similar fit indices were found for the models using all items in the team outcome efficacy measure.

theoretical alternatives (see Table 4).[2] Factor loadings for all items were greater than .70. The three-factor model was also the best fit to the data at Times 2, 3, and 4 (see Results for Hypothesis 4). As shown in Table 2, each team efficacy measure also demonstrated sufficient within-team agreement, aggregate reliability, and internal consistency.

To assess the convergent and discriminant validity of the three-factor model, we constrained phi coefficients for pairs of constructs to 1.0 and conducted chi-square difference tests. For each pair of constructs, constraining the correlation to 1.0 resulted in a worse fitting model. This finding demonstrates that each of the team capability beliefs is better understood as distinct. Furthermore, it demonstrates that common method variance alone cannot adequately account for the relationships observed (Podsakoff & Organ, 1986).

In sum, Hypothesis 1 that the three team capability beliefs are distinct was supported.

Predictive validity: Hypotheses 2 and 3

We turn now to Hypotheses 2 and 3 about the predictive validity of the team capability beliefs. We tested these hypotheses in sample 2, and assessed the effect of team capability beliefs at Time 1 (end of week 1) and at Time 2 (weeks 7 and 8) on team performance (the assignment was completed at approximately the same point as Time 2, but feedback was not received till week 9). Sample 2 descriptives and correlations are found in Table 5. The hypotheses were tested with relative weights analysis which estimates the proportionate contribution each independent variable makes to the R^2 in the dependent variable. The proportionate contribution of each

[2] *We acknowledge our small sample size for this analysis. Thus for exploratory purposes in sample 2, we also ran factor analyses at the individual level (N = 549 individuals), and at the team level without taking time into account (N = 356 teams). These additional analyses demonstrated that the items loaded as expected on to: team outcome efficacy, team process efficacy, and team potency (results available from the authors upon request).*

Table 5. Descriptives and correlations among team efficacy and dependent variables in sample 2 ($N = 89$ teams)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. TOE T1	4.54	1.53														
2. TOE T2	4.58	1.46	.74**													
3. TOE T3	3.68	1.40	.69**	.64**												
4. TOE T4	3.80	1.39	.66**	.64**	.65**											
5. TPE T1	7.84	0.78	.30**	.36**	.13	.15										
6. TPE T2	7.99	0.86	.28*	.45**	.17	.20†	.62**									
7. TPE T3	8.19	0.91	.10	.16	.27*	.15	.25*	.50**								
8. TPE T4	8.38	1.22	.13	.16	.30*	.25*	.27*	.46**	.73**							
9. TPOT T1	4.07	0.40	.53**	.53**	.45**	.39**	.55**	.47**	.32**	.40**						
10. TPOT T2	4.07	0.41	.52**	.61**	.38**	.43**	.49**	.58**	.38**	.34**	.64**					
11. TPOT T3	3.96	0.52	.35**	.35**	.53**	.39**	.18†	.34**	.70**	.63**	.54**	.54**				
12. TPOT T4	4.05	0.53	.29**	.37**	.43**	.44**	.08	.30*	.61**	.67**	.46**	.53**	.81**			
13. Performance	74.26	6.03	.19†	.18†	.41**	.31**	−.08	−.03	.26*	.23*	.04	.10	.39**	.39**		
14. Citizen T1	3.93	0.37	.23*	.27*	.14	.01	.62**	.54**	.30**	.30**	.53**	.43**	.27*	.21†	.03	
15. Citizen T2	4.05	0.45	.24*	.35**	.17	.10	.58**	.67**	.40**	.30**	.41**	.46**	.24*	.20†	−.05	.58**

Note. TOE, team outcome efficacy; TPE, team process efficacy; TPOT, team potency; Citizen, citizenship behaviour; T, time; †$p < .10$; *$p < .05$; **$p < .01$.

independent variable is expressed as a percentage of the total R^2 in the dependent variable; this percentage represents its unique contribution when combined with other variables. Relative weights analysis is appropriate because the team beliefs are correlated. Regression coefficients are not interpretable as measure of relative importance in the presence of interrelated predictors because this analysis assigns most of the variance accounted for to one variable and the other variables get what is left over. Therefore, significant regression weights are not a precondition of conducting a relative weights analysis (Johnson, 2000).[3]

Hypothesis 2 was supported. As expected, all three team capability beliefs predicted performance, accounting for 7% of the variance (see Table 6). Inspection of the relative weights show that, of the variance in performance accounted for by the team capability beliefs (i.e. 7%), as expected, team outcome efficacy made the largest contribution, explaining 58.53% (28.35 and 30.18% at Times 1 and 2, respectively). Also in line with our hypotheses, both team process efficacy and team potency contributed less to the prediction of team performance, accounting for 25.28% (19.90% at Time 1, 5.38% at Time 2) and 15.61% (4.83% at Time 1, 10.78% at Time 2) of the variance, respectively.

Table 6. Relative weights analysis assessing relationships between team efficacy and dependent variables (sample 2, $N = 89$)

	Performance: % of predictable variance[a]	Citizenship: % of predictable variance[a]
Step 1		
Year data collected	0.58	0.89
(T1 citizenship)		23.00
Step 2		
T1 team outcome efficacy	28.35	1.64
T1 team process efficacy	19.90	18.77
T1 team potency	4.83	4.96
Step 3		
T2 team outcome efficacy	30.18	4.00
T2 team process efficacy	5.38	37.90
T2 team potency	10.78	8.84
Adjusted R^2	7%	57%

Note. T1 citizenship was only used as a control when this outcome was of interest; T, time.
[a] The percentage indicates the unique contribution of the independent variable and its contribution when combined with other variables, in explaining the total R^2 in the dependent variable (performance/citizenship).

Hypothesis 3, that team process and team potency would predict team citizenship, was also supported (see Table 6). The relative weights analysis showed that 57% of the variance was explained in team citizenship (having had controlled for Time 1 team citizenship). As expected, team process efficacy made the largest contribution, explaining 56.67% (18.77 and 37.90% for Times 1 and 2, respectively) of this explained variance in Time 2 citizenship. Team potency contributed 13.80% (4.96 and 8.84% for

[3] *That aside, the analyses were also conducted with hierarchical regression and the same pattern of results emerged (results available from the authors upon request).*

Times 1 and 2, respectively) to this explained variance. Team outcome efficacy made a relatively small contribution only with 5.64% (1.64% at Time 1, 4% at Time 2) of the explainable variance.

Measurement invariance: Hypotheses 4 and 5

Hypothesis 4 was supported as each of the team efficacy measures were configurally invariant. The same number of factors emerged at the four time points in sample 2 (detailed results available from authors).

Hypothesis 5 regarding factorial invariance was assessed with a longitudinal covariance structure model for each construct separately. A model with the factor loadings freely estimated was compared to a model with the factor loadings constrained to be equal. The second model is nested under the first so a chi-square difference statistic can be calculated. If the chi-square difference is not significant, the construct is factorially invariant. Using this criteria, team process efficacy ($\Delta\chi^2 = 3.8$, $df = 6$, ns) and team potency ($\Delta\chi^2 = 9.7$, $df = 6$, ns) were factorially invariant. However, team outcome efficacy was factorially variant ($\Delta\chi^2 = 56.23$, $df = 9$, $p < .05$). Inspection of the factor loadings indicated that the item for the highest level of team outcome efficacy ('how confident and capable is your team to obtain a grade of 95–100%') differed over time. When this item was excluded, team outcome efficacy was factorially invariant ($\Delta\chi^2 = 10.49$, $df = 6$, ns; this version of the measure was used for testing Hypotheses 2 and 3). Hypothesis 5 was thus largely supported.

Discussion

Most of the literature in this field to date has explored the function of team capability beliefs, focusing on how team efficacy and team potency relate to performance (Gully *et al.*, 2002; Mathieu *et al.*, 2008). Little research has explored the structure of team capability beliefs (Gibson & Earley, 2007). Yet understanding both the function and structure of team efficacy enables the construct to be fully articulated; a necessary step for developing the full gamut of theoretical and practical insights (Morgeson & Hofmann, 1999). Our goal in this paper was to develop our understanding about the structure of team capability beliefs.

Key findings and their implications

Researchers have proposed that team efficacy is a multidimensional construct (Bandura, 1997; Gibson *et al.*, 2000; Mischel & Northcraft, 1997); and there is some, albeit limited, empirical work that suggests team efficacy and team potency are distinct (Gibson *et al.*, 2000; Gully *et al.*, 2002; Lee *et al.*, 2002). The current paper goes further to show that team outcome efficacy, team process efficacy, and team potency are three empirically distinct dimensions. We also showed using a longitudinal research design that predictive power of these constructs differ for various team outcomes. If these distinctions are not drawn in future team efficacy research, the value of team capability beliefs is likely to be obscured.

We particularly recommend paying attention to the difference between team outcome efficacy and team process efficacy. Team outcome efficacy was the strongest predictor of team performance, but at the same time, contributed little to team citizenship. Team process efficacy was the most important predictor of team

citizenship, suggesting that this team capability belief is important if teams are going to be able to work collectively on team outcomes in a collegial environment. However, team process efficacy was relatively unimportant for team performance, at least in the short term.

From a practical perspective, our study suggests that managers interested in team motivation and likely effectiveness need to assess both team outcome efficacy and team process efficacy. For example, if team performance is the primary concern of managers, team outcome efficacy needs to be bolstered, whereas if team citizenship is low, interventions for team process efficacy would be a higher priority. Team outcome efficacy might, for example, be developed by increasing clarity about the task, whereas team process efficacy might be built through a team coach who helps teams to work collectively. Although we have not focused on antecedents in the current paper, this is also an avenue ripe for future research; it will deepen our knowledge about the structure of the constructs.

In terms of generalizability, we expect the three team capability beliefs to emerge in all team situations. We also advocate that specific team efficacy beliefs will be better predictors of team outcomes in most contexts, although team outcome efficacy measures will need to be adapted so they are relevant for the context. When a team's outcomes are fuzzier, it may assist predictive validity to use multiple team outcome efficacy measures. For example, an emergency team might be trying to both respond quickly when there is a long queue in the waiting room, and also safely so patient care is not compromised. Team outcome efficacy for speed and safety may comprise two different constructs that enable better understanding of the complex notion, 'emergency team effectiveness'. The broader bandwidth of team potency may be most predictive when a team does not obtain realistic feedback. In this paper, both team performance and citizenship measures had a narrow bandwidth with realistic feedback; perhaps this is why the global construct team potency contributed less to the outcomes in this paper. Future exploration between team capability beliefs and outcomes of various bandwidths is therefore needed.

Our paper also provided good evidence for the validity and reliability of team capability beliefs, including the newly developed team process efficacy measure. Moreover, in a step rarely taken in organizational behavioural research, we ruled out gamma change (configural invariance) for each of the team capability beliefs, and showed that beta change did not exist for either team potency or team process efficacy.

However beta change did emerge for team outcome efficacy, suggesting that teams might experience a stretching or shrinking of what it means to have confidence for achieving high team performance. Teams rated themselves as having high levels of team outcome efficacy when they initially started working together, but perceived this same level of team outcome efficacy as harder to obtain later in the team life-span. Perhaps team polarization (Stoner, 1968) is at play, in which teams make more extreme judgments about their capacity to produce outcomes, and these extreme judgments change over time as members learn about the complexities of producing high team performance. To date, researchers have assumed it is appropriate to investigate mean-level change in team capability beliefs (e.g. Arthur *et al.*, 2007; Feltz & Lirgg, 1998; Jung & Sosik, 2003, Tasa *et al.*, 2007). We have demonstrated that this assumption needs to be tested. Exploring the conditions under which beta change emerges for team capability beliefs is a substantively interesting issue that deserves further inquiry. That aside, we did identify an adjusted team outcome efficacy measure without beta change.

Our paper also provides insight into how teams develop. In addition to exploring beta and gamma change, descriptive statistics of the mean change in this paper suggest some exciting avenues for future team research with alpha change. Our findings show that aspects of teams change in different ways over the same time period. In sample 2, the change trajectories ranged from positive change (team process efficacy means were 7.84, 7.99, 8.19, and 8.38), to small and perhaps random fluctuations (team potency means were 4.07, 4.07, 3.96, and 4.05), and potentially quadratic trends (team outcome efficacy means were 4.54, 4.58, 3.68, and 3.80). Team development models, such as Gersick's (1988) do not take into account how teams might move and change in different ways depending on the variable of interest. Our paper highlights the value of a more differentiated perspective on team development; teams may not develop in global or universal ways. Future research utilizing growth modelling with teams will thus be important.

Limitations and further research

The internal validity of this paper's findings is stronger than its external validity. In terms of internal validity, we had a longitudinal research design that included objective performance data. The external validity is weaker because the data were collected from MBAs working on class-based projects. However, the teams in this paper should not be equated with short-lived student samples working on time-limited tasks with little consequence. The teams worked interdependently for 8 months on team assignments which accounted for 40% of individual's final grade; emerging relationships were also important for alumni networking. Thus teams in this paper have parallels with multidisciplinary teams working on multiple projects.

A related issue concerns the comprehensiveness of the three types of team capability beliefs examined here. Teams in other contexts might have additional team efficacy beliefs. It would be of interest to explore whether there are more than two specific team efficacy constructs, and whether these are hierarchically related in some way. Structural equation modelling could be used to explore whether these constructs are hierarchically related to a generalized team efficacy factor (Lau, Yeung, Jin, & Low, 1999). Such analyses would tease out if there is a higher order umbrella construct for the variety of specific team efficacies, as well as how this higher-order construct relates to team potency.[4]

Conclusion

Our study suggests that in the future, researchers and practitioners should adopt a more fine-grained approach to enhance the predictive power of team capability beliefs; an approach that is currently lacking in the literature. Using a longitudinal design over several months, we demonstrate that task performance arises through teams developing confidence in achieving specific performance outcomes whereas citizenship particularly arises through teams developing confidence in their processes. Our findings also add to the growing evidence that specific rather than general constructs enhance the predictive power of team models and diagnostic tools (e.g. conflict: Jehn, 1995; team satisfaction: Mason & Griffin, 2003; trust: McAllister, 1995; and interdependence: Wageman & Baker, 1997). Finally, our study suggests that team capability beliefs will develop over time in different ways.

[4] *We thank an anonymous reviewer for suggesting this.*

Acknowledgements

We thank the participants in the research and those involved in the AGSM Alumni Mentor Programme for making this research possible. Preliminary results were presented at the 2002 Academy of Management Conference.

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Received 15 October 2008; revised version received 23 November 2009