Please cite this article as:
Maruping, L.M., Venkatesh, V., Thatcher, S., and Patel, P. "Folding Under Pressure or Rising to the Occasion? Perceived Time Pressure and the Moderating Role of Team Temporal Leadership," *Academy of Management Journal* (58:5), 2015, 1313-1333.
https://doi.org/10.5465/amj.2012.0468

FOLDING UNDER PRESSURE OR RISING TO THE OCCASION? PERCEIVED TIME PRESSURE AND THE MODERATING ROLE OF TEAM TEMPORAL LEADERSHIP

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ABSTRACT

Team temporal leadership orients teams toward managing the time-related aspects of their work. We examined how perceived time pressure affects team processes and subsequent performance under weak versus strong team temporal leadership. Results of a field study of 111 project teams show that the mediated relationship between perceived time pressure and team performance is non-linear. Moreover, this non-linear mediated relationship is moderated by team temporal leadership such that under strong team temporal leadership, the indirect effect of perceived time pressure on team performance is mostly positive; and under conditions of weak team temporal leadership, the indirect effect is positive at low levels of perceived time pressure and negative at intermediate to high levels. Implications for current and future time pressure research are discussed.

INTRODUCTION

Teams have emerged as an attractive form for organizing work largely because they possess better informational resources compared to individuals, they facilitate management of interdependence under increased task complexity and they are capable of integrating different sources of expertise to identify new product and service opportunities (Argote & Ingram, 2000; Gardner, Gino, & Staats, 2012). Team work often requires multiple tasks to be executed simultaneously, sequentially, or reciprocally (Marks, Mathieu, & Zaccaro, 2001; McGrath, 1991). Increasingly responsible for designing and bringing new products and services to market, teams often perceive that they are under time pressure (Amabile, Hadley, & Kramer, 2002). Thus, central to improving team performance is the ability to manage complex assignments involving multiple tasks under tight deadlines (Harrison, Mohammed, McGrath, Florey, & Vanderstoep, 2003). Unfortunately, research on teams has a mixed track record regarding their performance in the face of perceived time pressure (Driskell, Salas, & Johnston, 1999; Pearsall, Ellis, & Stein, 2009).

At the individual level, perceived time pressure has been found to enhance employee performance (e.g., Cavanaugh, Boswell, Roehling, & Boudreau, 2000; LePine, Podsakoff, & LePine, 2005). Indeed, various theoretical frameworks, such as the challenge-hindrance stressor framework, suggest that perceived time pressure is a positive stressor that motivates individuals to engage in activities that will overcome obstacles to performance (LePine et al., 2005). Other individual-level studies find a negative relationship between perceived time pressure and performance (e.g., Kelly & McGrath, 1985; McDaniel, 1990) and yet others find evidence of an inverted U-shape relationship (e.g., Baer & Oldham, 2006). At the team level also, empirical examinations have yielded mixed results about the effect of perceived time pressure on

performance. Some studies have found that perceived time pressure has a positive effect on performance (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996; Andrews & Farris, 1972; Pearsall et al., 2009). Other empirical studies at the team level show perceived time pressure having a negative effect on performance (e.g., Driskell et al., 1999; Perlow, 1999). However, this corpus of work does not explain when perceived time pressure has positive versus negative effects on performance.

One commonality across studies of perceived time pressure is that it affects performance through its impact on team members' interdependent actions—i.e., the sequencing and synchronization of tasks among team members that is required for teams to meet their objectives. The findings suggest that, under perceived time pressure, successful teams engage in task management activities that facilitate the execution of interdependent tasks (e.g., Chong van Eerde, Chai, & Rutte, 2011; Pearsall et al., 2009). In contrast, in less successful teams, team members withdraw from task management activities under perceived time pressure and focus on their own task assignments (e.g., Driskell et al., 1999; Perlow, 1999). This suggests that managing interdependence in task management processes is critical for achieving success when teams operate under perceived time pressure. Further, it raises important questions about the mechanisms through which perceived time pressure affects performance in field settings. Marks et al. (2001) note that external conditions in the task environment, such as deadlines, "dictate many aspects of team functioning, including the strategies that are employed, the pace of activities, and role assignments that develop in order for the team to perform successfully" (2001: 359). To this end, we answer Ancona, Okhuysen and Perlow's (2001) call for research to examine the link between temporal context, treated as an element of the task environment, and team functioning.

In seeking to address the theoretical ambiguity about how and why perceived time pressure affects team performance, we integrate views on the effect of perceived time pressure and views on the role of leadership in managing temporal issues in teams. First, as some research at the individual level suggests, perceived time pressure can have non-linear effects on task performance (Baer & Oldham, 2006; Ohly, Sonnentag, & Pluntke, 2007). Such research argues that perceived time pressure can be motivational at low to intermediate levels by evoking task engagement, but it can become detrimental at high levels. We consider the presence of such a relationship at the team level to add insight about the differential effects of perceived time pressure on performance in teams. Second, we propose that leadership will affect team performance under varying degrees of perceived time pressure. Prior research has shown that teams are not naturally adept at managing their temporal resources (e.g., Gersick, 1988; Labianca, Moon, & Watt, 2005). Team leaders, who have a high-level view of their teams' tasks and objectives, are in an ideal position to draw team members' attention to temporal issues as well as to provide guidance for efficacious responses under existing time constraints (Gevers, Rutte, & van Eerde, 2006; Morgeson & DeRue, 2006). But just what is it that team leaders should do when their teams are faced with increasing perceived time pressure? Current literature offers limited guidance on this issue.

We delve into this question by investigating the contingent role of team temporal leadership (Mohammed & Nadkarni, 2011) in shaping project teams' responses to perceived time pressure. Following Mohammed and Nadkarni's definition, we conceptualize *team temporal leadership* as "leader behaviors that aid in structuring, coordinating, and managing the pacing of task accomplishment within the team" (2011: 492). In contrast, broader task-oriented leadership, such as initiation of structure, does not overtly encompass temporal considerations

(Mohammed & Nadkarni, 2011) and, therefore, may be less precise in offering guidance on how teams will perform under perceived time pressure.

Drawing on the literature on perceived time pressure, we explain how perceptions of heightened time pressure affect teams' efforts in managing their temporal resources. By integrating literature on temporal leadership with research on perceived time pressure, we posit that temporal leadership plays an important role in directing teams' attention to the need for *team processes,* defined as task management processes that teams use to handle interdependencies between the multiple tasks for which they are responsible (Marks et al., 2001). We propose that strong team temporal leadership enables teams to use perceived time pressure as a motivator for, rather than a discourager of, interdependent task management activities. Given the non-linear effects of perceived time pressure, our theory proposes that strong team temporal leadership attenuates the curvilinear effect of perceived time pressure on team functioning by enhancing its positive effects and reducing its negative effects. As a consequence, the indirect effect of perceived time pressure through team processes is proposed to vary as a function of (1) the degree of perceived time pressure and (2) the strength of team temporal leadership.

Our work advances theory in several important ways. First, we extend theory on the effects of time pressure by identifying conditions under which perceived time pressure, at the team level, has a positive, rather than a negative, effect on team performance. This is accomplished by integrating research on the inverted U-shape effects of perceived time pressure with literature on team temporal leadership. The identification of leadership interventions that shape responses to perceived time pressure is quite limited. Second, we advance theory on the effects of perceived time pressure by uncovering its non-linear mediated effects under weak versus strong team temporal leadership. Prior theory has implicitly assumed a linear mediated

relationship and has focused on a narrow set of team processes. Finally, we advance the study of temporal leadership. Although prior work has focused on the contingent role of temporal leadership based on team composition (Mohammed & Nadkarni, 2011), we have a limited understanding of this important leadership role in the context of perceptions of the task environment and team processes.

THEORY AND HYPOTHESES

Perceived Time Pressure in Teams

Time pressure is a common feature of organizational work (Gersick, 1988; Gevers, Rutte, & van Eerde, 2006; Waller, Zellmer-Bruhn, & Giambatista, 2002) and has been found to affect behavior and performance in teams (e.g., Chong et al., 2011; Karau & Kelly, 1992; Kelly & Loving, 2004; Pearsall et al., 2009; Perlow, 1999). It is defined as the perception that there is a scarcity of time available to complete a task, or set of tasks, relative to the demands of the task(s) at hand (Cooper et al., 2001; Kelly & McGrath, 1985). This is conceptually distinct from performance pressure, which focuses on shared accountability for outcomes, high scrutiny of work, and significant consequences of performance outcomes (Gardner, 2012). Perceived time pressure is also conceptually distinct from urgency. Urgency is a stable trait that reflects a concern for time and a feeling of being chronically hurried (Mohammed & Nadkarni, 2011). In contrast, perceived time pressure is often cast as an evaluation of the task environment, as opposed to being an individual trait.

A number of prior studies have found a positive relationship between time pressure and team performance. For example, an experiment by Pearsall et al. (2009) showed that teams under high perceived time pressure conditions reported higher levels of problem-solving and exhibited an improved coping style, compared to teams in other experimental conditions. Moreover, such

teams achieved greater performance than other teams in the experiment. In a field study of new product development teams, Chong et al. (2011) found that, when experienced as a motivator, time pressure positively influenced team coordination and performance. Other studies, adopting a social entrainment perspective, have found that actual time pressure acts as a "pacer"—a mechanism that allows teams to calibrate the speed of task execution relative to existing time constraints—that increases team performance (e.g., Kelly & Karau, 1999; Kelly & Loving 2004; Kelly & McGrath, 1985; Waller et al., 2002). Taken together, these studies support the view of perceived time pressure as a factor that promotes positive behaviors that enhance team performance.

Contrary to the positive view advanced above, there are studies that show a negative relationship between perceived time pressure and team performance. For instance, although they focused on varying actual time pressure, Karau and Kelly (1992) found that teams working under greater time pressure produced outputs that were of lower quality, creativity, and depth than those of teams working under lesser time pressure. Similarly, Kelly and McGrath (1985) found that teams initially operating under greater time pressure performed poorly (i.e., produced outputs of lower quality and quantity) on initial and subsequent tasks, even when subsequent tasks involved less time pressure. In contrast, they found that teams that initially operated under lower time pressure had higher performance even when subsequent tasks involved greater time pressure. An experiment by Driskell et al. (1999) found that perceived time pressure led to lower performance in teams. Durham, Locke, Poon, and McLeod (2000) also argue that perceived time pressure negatively affects teams' willingness to seek knowledge to inform their decisions. It also negatively affects teams' confidence in their decisions (Durham et al., 2000). Finally, the negative effect of perceived time pressure is revealed in Perlow's (1999) sociology of time

framework, where perceptions of time pressure cause developers to engage in an endless cycle of inefficient time use, thus constraining goal achievement.

What accounts for this differential influence of perceived time pressure on team performance? One stream of research suggests that the level of perceived time pressure may provide part of the explanation. In particular, empirical research on the effects of job demands (which include time pressure) has found support for an inverted-U shape relationship with various employee outcomes, such as creativity (e.g., Baer & Oldham, 2006; Ohly, Sonnentag, & Pluntke, 2007), job satisfaction (e.g., Zivnuska, Kiewitz, Hochwater, Perrewe, & Zellars, 2002) and job performance (e.g., Janssen, 2001). The argument underlying this body of work is that moderate perceived time pressure provides the necessary motivation to keep employees engaged in their work, whereas the absence of perceived time pressure provides little stimulation and high perceived time pressure is debilitating or distracting. Although this research has been conducted primarily at the individual level, such a view of perceived time pressure has the potential to yield insights at the team level.

Perceived Time Pressure and Team Functioning

Perceived time pressure has been studied at the individual level, and in this research we extend its conceptualization to the team level. Specifically, we conceptualize perceived time pressure as a shared property of the team. Shared properties originate from the common experiences and perceptions of team members, and social interactions underscore the primary process underlying the emergence of such properties (Klein & Kozlowski, 2000). Perceived time pressure emerges as a shared property of teams for several reasons. First, consistent with prior literature, perceptions of time pressure are shaped by the task environment (Gardner, 2012). As members of a team work together to accomplish team tasks, they are exposed to the same task

environment. This is likely to create convergence in their perceptions of the time pressure. Second, research on emotional contagion suggests that social interactions can facilitate the transmission of the emotional state of social actors (Pugh, 2001). Perceptions of time pressure experienced by individuals can be transmitted across various team members through their interactions. Finally, given the task and outcome interdependence of teams in field settings, perceptions of time pressure are likely to converge, as members are dependent on each other for task inputs and are jointly responsible for producing team outputs. With such interdependence, team members are likely to increasingly share their perceptions of time pressure.

Perceived time pressure influences performance by affecting team behaviors or processes. Project teams often perform work that involves multiple tasks that must be managed simultaneously and each task is made up of multiple, interrelated subtasks (Marks et al., 2001; McGrath, 1991). While task work represents the substantive content of team work (Bowers, Braun, & Morgan, 1997), team processes represent the interdependent acts through which teams organize task work to achieve their goals (Marks et al., 2001). These processes are enacted over multiple interaction episodes and as tasks are not carried out in isolation, they often overlap with each other and last for varying durations (McGrath, 1991). Research shows that effective team processes are critical for achieving high team performance (Mathieu et al., 2006). They serve as a vehicle for transforming team inputs into high quality, timely outcomes (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Marks et al. (2001) developed a taxonomy of team processes that identifies three overarching categories of processes that are tied to points in time (or phases) in team activity: transition, action, and interpersonal processes. *Transition processes* are team processes that are executed during periods of time when teams are focused on evaluation and planning activities—such as mission analysis, goal

specification and strategy formulation—that guide goal accomplishment (Marks et al., 2001). *Action processes* are team processes that are carried out during periods of time when teams are engaged in acts—such as task coordination, monitoring progress toward goals, and team monitoring—that contribute directly to goal accomplishment (Marks et al., 2001). Teams go through recurring cycles of action and transition processes to help them manage the complexity of executing multiple overlapping tasks in their work environments (Mathieu et al., 2006). *Interpersonal processes* are activities geared toward managing relationships between team members and include conflict management, motivating/confidence building and affect management (Marks et al., 2001). Unlike transition and action processes, interpersonal processes do not occur in phases.

Team processes. During a transition phase, teams engage in various activities, such as planning, reflection and evaluation, to guide their progress toward accomplishing objectives (Marks et al., 2001). Marks et al. (2001) argued that teams engage in different forms of planning. Through deliberate planning, team members discuss their formal action steps for accomplishing goals. Contingency planning enables teams to develop alternative courses of action that can be taken in the face of potential anticipated events in the task environment. Reactive planning involves spur of the moment planning in response to unexpected events that affect the team's ability to achieve its objectives. Marks et al. (2001) note that teams also use transition phases to identify and prioritize key goals and sub-goals that need to be achieved in service of their overall objectives.

Action processes involve monitoring progress toward goals, systems monitoring, team monitoring and backing-up behavior, and coordination (LePine et al., 2008; Marks et al., 2001; Mathieu et al., 2006). By monitoring progress toward goals, teams assess their performance

relative to their objectives and determine what needs to be done (Tschan, 2002). Systems monitoring enables teams to keep track of resources and the external environment to ensure that they have what they need to accomplish their goals. Through monitoring and backing-up behavior, team members provide each other with feedback and provide assistance in executing tasks (Porter, 2005). Coordination involves the synchronization of team member activities so that their timing and sequencing helps goal achievement (Marks et al., 2001). Taken together, these action processes enable teams to direct their resources more efficiently toward task accomplishment.

Interpersonal processes involve team efforts to manage conflict, develop and maintain a sense of collective motivation, and regulate team members' affect (Marks et al., 2001). Conflict management represents teams' effort to either preemptively prevent, or control, conflict or to manage it when it actually occurs (Simons & Peterson, 2000). Through motivation and confidence building, teams aim to generate and maintain a sense of motivation about their objective and their confidence in accomplishing their objective. Affect management reflects teams' efforts to regulate potentially destructive emotions, such as frustration or anger, during mission accomplishment (Marks et al., 2001). Failure to manage these interpersonal concerns has been argued to have a negative effect on team performance (e.g., Jehn, Northcraft, & Neale, 1999; Maruping & Agarwal, 2004).

Perceived time pressure and team processes. Following the logic of activation theory, perceived time pressure is expected to have an inverted-U shape relationship with team processes. Low levels of perceived time pressure promote minimal levels of activation (Baer & Oldham, 2006; Ohly et al., 2007). Consistent with this logic, Gersick (1988) and others (e.g., Waller et al., 2002) find that teams are less attentive to the planning-related issues that

characterize team transition processes when time is not seen as a constraint. As perceived time pressure increases from low to intermediate levels, teams become more attentive to looming deadlines and feel the need to develop a clear course of action for achieving objectives. Baer and Oldham (2006) suggest that intermediate levels of perceived time pressure are optimal for facilitating the experience of activation—the stimulation or arousal that motivates individuals to engage with the task at hand (Gardner, 1990). At intermediate levels of perceived time pressure, team members perceive that it is still possible to complete task requirements within the time available (Baer & Oldham, 2006; Ohly et al., 2007). Team members are not only prompted to engage in transition processes, they also become proactive in executing the interdependent actions necessary for accomplishing assigned tasks (Ohly et al., 2007). Chong et al. (2011) find that the more team members perceive time pressure as a motivational challenge, the more likely they are to engage in the coordination activities necessary to complete their tasks. With an elevated sense of task engagement, team members are likely to build confidence and motivate each other to achieve their objectives.

High levels of perceived time pressure cause teams to become more concerned with executing the activities that contribute directly to task accomplishment (Kelly & McGrath, 1985; Waller et al., 2002). Consequently, they are less likely to take the time necessary to engage in various task management processes, such as transition, action and interpersonal processes. Karau and Kelly (1992) note that perceived time pressure causes teams to restrict their focus to task completion as their primary objective. Such teams are less systematic in the way they process information and tend to avoid deeper and purposeful discussion of alternative courses of action or evaluation of chosen actions (Karau & Kelly, 1992; Kelly & Karau, 1999). High levels of perceived time pressure also reduce the likelihood that teams discuss the timing and sequencing

of task execution, as teammates are unlikely to coordinate their work (Chong et al., 2011). Finally, perceived time pressure increases the likelihood of conflict, as confusion emerges about who should complete what tasks under limited time constraints. Limited time to resolve conflicts leads to heightened frustration among team members. In sum, high levels of perceived time pressure result in a pressing need to simply get things done. Such reactions are consistent with hindrance views of perceived time pressure and should reduce the likelihood that team processes are executed efficaciously (Chong et al., 2011).

Hypothesis 1: Perceived time pressure will have an inverted-U relationship with team processes.

The perspective laid out above provides a potentially compelling explanation regarding the inconsistent views of perceived time pressure and its effects on performance in teams. However, it is also somewhat incomplete. One limitation is that it fails to explain why some research finds a negative linear effect of perceived time pressure on team performance (e.g., Driskell et al., 1999). Another limitation is that it fails to explain why some teams are able to perform well under high levels of perceived time pressure. Amabile et al. (2002) suggest that high levels of perceived time pressure can function as a motivator, such as when individuals view themselves as being on a mission and feel they have control over their work. This suggests that teams' performance may be affected positively when team members experience moderate to high levels of perceived time pressure.

In addition to the limitations noted above, we suggest that, although perceived time pressure can act as a positive force, teams differ in their ability to transform this source of task motivation into action, sometimes allowing it to become more of a hindrance. McGrath (1991) casts time as an environmental driver that shapes how teams manage the bundles of activities

that constitute their work. However, as subsequent research has shown, such time constraints must be perceived before teams will act on them and this often does not occur until task deadlines draw near (Waller et al., 2002). Therefore, the effect of perceived time pressure on team processes depends on how well-equipped teams are to address temporal issues and the tasks assigned to the team. As we will argue next, team leaders have a vital role to play in enabling teams to manage perceived time pressure.

Team Temporal Leadership

The preceding discussion suggests that when team members respond positively to perceived time pressure, they have the motivation and ability to perform the necessary interdependent processes to achieve their objectives (Pearsall et al., 2009). This ability to respond positively to perceived time pressure may stem from motivational factors, such as team members' believing in their task-related abilities (Gevers, van Eerde, & Rutte, 2001). In contrast, team members who view perceived time pressure negatively find themselves experiencing process losses due to their inability to manage interdependent tasks (Chong et al., 2011; Driskell et al., 1999). This inability may stem from a lack of knowledge or ability about how to manage tasks under time pressure (Blunt & Pychyl, 2000; Hunter & Thatcher, 2007). Team leadership, with its high-level view of the team, its tasks and task environment, and its objectives, has a prominent role in enabling teams to function under such circumstances (Morgeson, DeRue, & Karam, 2010; Morgeson & DeRue, 2006).

The literature has been largely silent about the role of leadership in enabling teams to negotiate the temporal aspects of the work environment (for exceptions, see Ancona, Goodman, Lawrence, & Tushman, 2001; Bluedorn & Jaussi, 2008; Mohammed & Nadkarni, 2011; van der Erve, 2004). Functional leadership theories, which emphasize the role of leadership in

performing activities that teams are ill-equipped to manage, suggest that leaders have an important role to play in enabling teams to manage temporal challenges such as perceived time pressure (Morgeson et al., 2010; Morgeson & DeRue, 2006). Consequently, management of temporal matters in team contexts is increasingly a critical leadership function (Halbesleben, Novicevic, Harvey, & Buckley, 2003).

Team temporal leadership involves the structuring, coordination, and management of task pacing in team work (Mohammed & Nadkarni, 2011). Such pacing of task accomplishment is facilitated through the scheduling of key milestones ahead of task deadlines, synchronizing team members' inputs and outputs, and allocating temporal resources (i.e., available time) to ensure that there is adequate time to accomplish team goals. Taken together, these behaviors motivate teams to attend to the temporal aspects of their work, enabling them to effectively mobilize their resources within given time constraints. Mohammed and Nadkarni (2011) recently found that team temporal leadership is important for regulating the effects of team temporal diversity on team performance. Here, we focus on understanding how team temporal leadership enables teams to regulate their internal activities, as embodied in team processes, in response to perceived time pressure—an appraisal of the external task environment. As we argue next, team temporal leadership is especially critical in shaping whether teams respond positively or negatively to perceived time pressure. This represents an important mechanism for leaders to leverage the positive effects or mitigate the negative effects of perceived time pressure (Halbesleben et al., 2003).

Moderating Role of Team Temporal Leadership

Effects under strong team temporal leadership. Team temporal leadership will moderate the inverted-U relationship between perceived time pressure and team processes. Specifically,

under strong team temporal leadership, the positive effects of perceived time pressure are enhanced and the negative effects are mitigated. When time pressure-induced activation is coupled with strong team temporal leadership, teams are in an optimal position to enhance team processes. This is because at intermediate levels of perceived time pressure, teams are motivated to attend to the time pressure they are experiencing and strong team temporal leadership provides them the guidance to formulate a plan of action that is sensitive to their time constraints.

Strong team temporal leadership enables teams to respond positively to perceived time pressure via engagement in transition processes. The guidance that team temporal leadership provides for teams to deal with temporal issues leads teams to view time pressure as a motivator and elicits a problem-solving style of coping (LePine et al., 2005). Strong team temporal leadership embodies the necessary accumulated knowledge about how to organize and manage interdependent actions under time scarcity (Mohammed & Nadkarni, 2011) and enacting such knowledge enables teams to perform the appropriate processes (Gevers et al., 2001). Such guidance is useful for managing low to moderate levels of perceived time pressure. Teams are more adept at achieving their objectives when they take time to discuss their task strategies within the context of existing time constraints (Gevers et al., 2009). Teams are also more likely to prioritize goals and sub-goals to emphasize those that are most important given existing time constraints (Schriber & Gutek, 1987). Gevers, Rutte, and van Eerde (2006) argue that temporal reminders trigger teams to attend to such temporal aspects of task execution when the pressure of a deadline exists and team leaders are able to issue and enforce reminders (Mohammed & Nadkarni, 2011; Morgeson et al., 2010).

In addition to scheduling behaviors, team temporal leadership involves synchronizing the timing of team member actions so that work is completed on time (Schriber & Gutek, 1987).

When team leaders raise awareness of the need to synchronize activities, teams are likely to respond to perceived time pressure by attending to the coordination and timing of tasks and sub-tasks (Gevers et al., 2006). Janicik and Bartel (2003) note that temporal awareness trains teams to respond effectively to temporal conditions such as time pressure. Other research has argued for a link between teams' attention to time and their level of task-related activity (e.g., Gersick, 1988; Waller, Giambatista, & Zellmer-Bruhn, 1999; Waller et al., 2002).

By allocating temporal resources (e.g., building in time for dealing with problems), strong team temporal leadership provides a context in which teams are able to resolve conflicts and manage emotions through interpersonal processes (Mohammed & Nadkarni, 2011). With strong team temporal leadership, team members are able to think and talk about resolving task-related conflicts within the context of existing time constraints (e.g., task prioritization, interim deadline management). Team temporal leadership also provides teams with the temporal resources that can boost their confidence and enable them to respond positively to perceived time pressure (Gevers et al., 2001).

Effects under weak team temporal leadership. In contrast to teams under strong team temporal leadership, the negative effects of perceived time pressure are magnified and the positive effects are mitigated under weak team temporal leadership. Low levels of perceived time pressure promote minimal levels of activation (Baer & Oldham, 2006; Ohly et al., 2007) and weaker temporal leadership limits engagement in team processes from team members. Although team members may be aware of time constraints, under weak temporal leadership they may not be equipped with the necessary tools to put a plan of action into place within the context of those constraints (Mohammed & Nadkarni, 2011). Labianca et al. (2005) find that teams are not

naturally equipped to handle temporal constraints, such as perceived time pressure, and this may disrupt their existing temporal schema, especially when weak temporal leadership is present.

Perceived time pressure reduces the likelihood that teams discuss the timing and sequencing of task execution, as teammates are unlikely to coordinate their work (Chong et al., 2011). When team temporal leadership is weak, teams lack the confidence and ability to manage temporal challenges (Durham et al., 2000). Consequently, they often adopt an avoidance strategy, enabling perceived time pressure to disrupt team coordination and backing up behavior (Chong et al., 2011; Driskell et al., 1999). In such conditions, teams respond to perceived time pressure by shunning these task management processes. In sum, although perceived time pressure may cause teams to focus on task execution, it reduces their focus on the process of *managing* task execution—i.e., action processes.

In teams with weak team temporal leadership, perceived time pressure should deteriorate interpersonal processes. First, although intermediate levels of perceived time pressure activate team members to be engaged with their tasks, frustration and anger can set in, as they lack the ability to handle the task challenges posed by such pressure (Perlow, 1999). Second, as noted earlier, perceived time pressure increases the likelihood of conflict as confusion emerges about who should complete what tasks under limited time constraints. The ability to effectively schedule and synchronize tasks under such conditions is important for resolving conflicts. Thus, when team temporal leadership is weak, teams are unable to engage in the necessary discussions to manage task-related conflict. Finally, under weak team temporal leadership, team members lack confidence in their ability to accomplish their objectives within the remaining time (Chong et al., 2011).

Hypothesis 2. Team temporal leadership will moderate the inverted-U shape relationship between perceived time pressure and team processes such that the negative effect is enhanced when temporal leadership is weak; and the positive effect is enhanced and the negative effect is mitigated when temporal leadership is strong.

Mediation Effects

Team processes are expected to mediate the relationship between perceived time pressure and team performance. *Team performance* is defined as the extent to which a team's project deliverable is produced on time, within budget and is of high quality (Wallace, Keil, & Rai, 2004). Team processes constitute the primary mechanism through which teams transform their inputs into performance outcomes and previous theoretical (e.g., Ilgen et al., 2005; Marks et al., 2001), empirical (e.g., Mathieu et al., 2006), and meta-analytic (e.g., LePine et al., 2008) work has supported a positive relationship between these team processes and team performance. Consequently, we direct our attention to the indirect effects of perceived time pressure through these team processes. Drawing on this logic, teams' performance in the face of perceived time pressure is shaped by the actions they take.

Under strong team temporal leadership, hypothesis 2 suggests that the positive effects of perceived time pressure on team processes would be enhanced and the negative effects mitigated. Given the positive influence of team processes on team performance, we expect perceived time pressure to have a positive indirect effect on team performance (through team processes) at low to intermediate levels. As high perceived time pressure erodes teams' ability to engage in team processes, we expect the indirect effect to become non-significant at such levels.

Under weak team temporal leadership, the preceding hypothesis indicates that perceived time pressure should enhance the negative effects on team processes, with the relationship being

non-significant at low levels of perceived time pressure and negative at intermediate to high levels. Building on this logic, the inverted-U shape effect of perceived time pressure is expected to be transmitted through team processes such that the indirect effect on team performance is non-significant at low levels of temporal leadership and negative at intermediate to high levels of temporal leadership. In sum, the mediated inverted-U shaped perceived time pressure → team process → team performance relationship will be moderated by team temporal leadership.

Hypothesis 3. Team temporal leadership will moderate the indirect effect of perceived time pressure on team performance via team processes. When team temporal leadership is strong, the indirect effect of perceived time pressure will be positive at low to intermediate levels and non-significant at high levels; and when team temporal leadership is weak, the indirect effect of perceived time pressure will be non-significant at low levels and negative at intermediate to high levels.

INSERT FIGURE 1 ABOUT HERE

METHOD

Organizational Context

The setting for this study was a software firm in India. The firm's primary mission is to create customized software that supports the business operations of client firms from around the world. This involves a client firm identifying specific software needs and then developing a contractual arrangement with the Indian firm to develop a customized solution. For instance, one client firm requested a customized customer relationship management system to manage its inter-organizational partnerships. The contracts that the firm signed with clients stipulated requirements for how the software would function as well as specific deadlines within which the

software solution would be delivered. As is often the case in such arrangements, there were penalties if the firm failed to adhere to the contractually agreed upon delivery deadline or the delivered software failed to include the expected functionality.

This firm provided an ideal setting for studying the relationship between perceived time pressure and team temporal leadership in affecting team processes and performance. First, this was a team-based organization. When the firm signed a contract with a client, the firm's management would then assign a project team composed of employees with the relevant expertise. Each project team was an intact unit with clear boundaries such that team members saw themselves and were seen by others as being a distinct collective. Moreover, team members were jointly responsible for the outcome of their team's project. Each project team reported to a team leader who was responsible for ensuring that contract obligations were met. Second, because projects involved contractually agreed upon deadlines for completion and delivery, this study setting provided an excellent opportunity to observe issues pertaining to time pressure. Penalties for failing to meet predetermined delivery schedules or quality metrics had direct implications for the project teams involved. Specifically, employee performance evaluations, year-end bonuses and promotions were tied to performance on these software projects. Third, the nature of the project work was non-routine. Each client firm had its own idiosyncratic business processes, standard operating procedures, reporting structures, and technology infrastructure. This meant that there were no predetermined off-the-shelf solutions that could simply be applied to each client. Rather project teams had to work to create solutions that were tailored to the client firm's specific needs. This made it important for project teams to manage their temporal resources within project deadlines.

Finally, the nature of the work was such that it involved multiple overlapping and interdependent tasks among team members. Employees were considered part of the team if (a) their name appeared on the project roster and (b) reported to the same project leader. Each project team consisted of employees with expertise in various technical domains that were relevant to software development. To gain a better understanding of the nature of the teams' work, we randomly chose five teams. Next, we randomly picked four employees from each team for personal interviews. During the interview, the respondents were asked to provide answers to open ended questions related to their project activities. The core functions of members on each project team included system analyst, programmer, database designer, and system architect. System analysts were primarily responsible for working with the client firm to understand the business processes that would be supported by the software, the responsibilities of the people who would be using the software, and the kind of data that the software would process. They modeled this information in technical documentation that served as the blueprint for programmers and database designers to build the software. Programmers were responsible for building the software code that would capture and process data. Database designers were tasked with developing the database in which data would be stored and used by the software. Finally, the system architect was responsible for designing the technical infrastructure (i.e., networks, servers, etc.) on which the software would be deployed. The software code and the database had to be designed to operate within the specified technical infrastructure. Thus, there was sequential and reciprocal task interdependence between team members across these different areas of responsibility.

Sample and Procedure

The initial survey was sent electronically to 1571 employees representing 139 teams. The final study sample included 1115 employees in 111 project teams with an average response rate of 71% per team. On average, employees had 4.35 years of project experience (s.d = 2.80). The mean age of employees was 33.20 (s.d = 6.40) and 28% of them were female. Project team sizes ranged from 8 to 14. There were no statistically significant differences between respondents and non-respondents on age, gender, and organizational tenure.

The projects in our sample were scheduled to launch around the same time and were each expected to be completed in two months. In order to track responses over time and to link responses to teams, each survey was coded. Once data collection was completed, respondent anonymity was maintained by discarding information linking names to the coded surveys.

Measurement Timing

At the project launch, team members responded to a short survey that requested demographic information. Perceived time pressure, team temporal leadership, and team processes were measured every two weeks over the course of the projects. For the purpose of our model testing, we used perceived time pressure measured at the mid-point of each project (i.e., halfway between the project launch and the deadline in the contract). This point was chosen because prior theory and empirical research on teams shows that this is the point at which teams naturally become cognizant of temporal constraints in their work (e.g., Gersick, 1988; Waller et al., 2002). Thus, for our analysis, the project mid-point (one month after project launch) was used as the baseline measurement point, time 1 (T1). Following the temporal ordering of our model, we used team temporal leadership measured at time 1. We used the team processes measured at time 2 (T2), two weeks after T1. Project team leaders rated the performance of their teams after the software solution had been delivered to the client (T3).

Measures[1]

Perceived time pressure. A four-item scale by Durham and colleagues (2000) was adapted to assess perceived time pressure. The scale reflects the extent to which team members feel that they have little time to complete their work. The scale demonstrated acceptable reliability and aggregation statistics (individual-level $\alpha = 0.80$, median $r_{wg(j)} = 0.74$, ICC[1] = 0.28, ICC[2] = 0.76).[2] Within-team member responses were aggregated to compute a team-level score.

Team temporal leadership. A seven-item scale developed and validated by Mohammed and Nadkarni (2011) was used to assess team temporal leadership. Team members responded to questions such as "to what extent does your team leader remind members of important deadlines?" and "to what extent does your team leader urge members to finish sub-tasks on time?" The seven-item scale used 1 = "not at all" and 7 = "a great deal" as anchors (individual-level $\alpha = 0.77$). The aggregation statistics suggested that it was appropriate to aggregate within-team responses (median $r_{wg(j)} = 0.82$, ICC[1] = 0.18, ICC[2] = 0.80). Hence, we averaged the scores provided by respondents within each team to compute a team-level score of team temporal leadership.

Team processes. Following Mathieu et al. (2006), we measured team processes using scales for team transition, action, and interpersonal processes. The scale for team transition processes was derived from Marks and colleagues' (2001) superordinate taxonomy of team processes and reflects the extent to which teams engage in mission analysis, goal specification,

[1] The items are shown in Appendix A.

[2] To determine whether it was appropriate to aggregate ratings of this measure from multiple members within each team we assessed the interrater agreement index ($r_{wg(j)}$) and intraclass correlation coefficients (Bliese, 2000; James, Demaree, & Wolf, 1984). The $r_{wg(j)}$ represents the extent to which team members' responses to a scale converge is greater than would be expected by chance (James et al., 1984). The recommended threshold value for aggregation is a median value of .70 (LeBreton & Senter, 2008). ICC(1) reflects the proportion of variance that can be attributed to between-team differences. A threshold value of .12 is recommended in field settings (Bliese, 2000). ICC(2) represents the reliability of the team-level means and has a recommended threshold value of .70 (Bliese, 2000).

and strategy formulation and planning. The scale had adequate reliability and aggregation statistics suggested that it was appropriate to compute a team-level score for team transition processes by averaging within-team ratings (individual-level $\alpha = 0.80$, median $r_{wg(j)} = 0.71$, ICC[1] = 0.26, ICC[2] = 0.75). Team action processes were measured using scales from Mathieu et al. (2006), descriptions of task management activities by Marks et al. (2001), and a scale on backing up behavior by Porter (2005). The scale assesses the extent to which teams engage in various activities, such as monitoring progress toward goals, team backup behavior and coordination (individual-level $\alpha = 0.72$, median $r_{wg(j)} = 0.75$, ICC[1] = 0.25, ICC[2] = 0.77). For interpersonal processes, scales from Mathieu et al. (2006) and Jehn et al. (1999) were adapted to create a 10-item measure for team interpersonal processes. The scale assesses the extent to which the team creates an environment of trust and works to resolve task and affective conflict when it emerges (individual-level $\alpha = 0.79$, median $r_{wg(j)} = 0.74$, ICC[1] = 0.19, ICC[2] = 0.76).

Fit indexes for three first-order factors (the three team processes) and one second-order factor were within acceptable levels (CFI = .95, GFI = .95, SRMR = .06, RMSEA = .07) (Hu & Bentler, 1999), thus suggesting that a superordinate team process variable could be computed by averaging scores for three team processes (LePine et al. 2008; Mathieu et al., 2006). The combined team process measure demonstrated adequate reliability and the aggregation statistics were acceptable (individual-level $\alpha = 0.71$, median $r_{wg(j)} = 0.71$, ICC[1] = 0.22, ICC[2] = 0.71).

Team performance. In light of our interest in the ability of teams to perform under varying levels of perceived time pressure, we focused on assessing the quality of the output they produced. Hence, we measured team performance using a scale from Wallace et al. (2004). The four-item scale asked team leaders whether their team's project output met client expectations,

was of a high quality, and was delivered on time and within budget. The scale demonstrated good reliability ($\alpha = 0.82$).

Control variables. A number of control variables were included in the analyses. First, we included team tenure, or average tenure of the team members, as teams that have been together longer are likely to establish practices that yield better performance compared to newly established teams. Second, as larger teams tend to have greater coordination costs that could affect their ability to manage time pressure, we controlled for team size, or count of team members. Finally, average team member project experience was used to assess team members' familiarity with their task assignments. Teams with greater task familiarity are more likely to perform well in the face of perceived time pressure compared to teams with limited task experience. Each team member indicated the number of years they had performed the kind of work assigned to them. We averaged these data within each team. Further, in order to isolate the effects of perceived time pressure, we controlled for discrepancies in perceptions of time pressure within teams. To accomplish this, we computed the within-team standard deviation of perceived time pressure. This helps us ensure that any observed effects are indeed attributable to the level of perceived time pressure.

INSERT TABLE 1 ABOUT HERE

Analytical Approach

Before proceeding to test the hypotheses, we assessed the measurement model for responses obtained from team members. Specifically, we assessed the fit of a three-factor model (perceived time pressure, team temporal leadership, and team processes). The measurement model indicated a good fit to the data (CFI = .96, GFI = .97, SRMR = .07, RMSEA = .07).

Table 1 lists means, standard deviations and correlations of variables used in the analyses. As Table 1 illustrates, perceived time pressure is negatively correlated with team processes ($r = –.26$, $p < .001$). Furthermore, team processes are positively correlated with team performance ($r = .26$, $p < .001$).

To test hypothesis 1, we performed a regression analysis. Hypothesis 2—which posited a moderation effect of team temporal leadership on the inverted-U relationship between perceived time pressure and team processes—was tested using moderated regression analysis. In order to test hypothesis 3—which predicted moderated non-linear indirect effects of perceived time pressure on team performance through team processes—we conducted a moderated-mediation analysis (Edwards & Lambert, 2007; Preacher, Rucker, & Hayes, 2007) followed by a test of instantaneous indirect effects at varying levels of team temporal leadership (Hayes & Preacher, 2010).

INSERT TABLE 2 ABOUT HERE

Hypotheses Linking Perceived Time Pressure to Team Processes

Hypothesis 1 predicted that perceived time pressure would have an inverted-U shape relationship with team processes. Support for this hypothesis is found if the coefficient on the quadratic term is negative and significant (Balkundi, Kilduff, Barsness, & Michael, 2007). In order to reduce possible non-essential multicollinearity, we mean-centered the perceived time pressure variable prior to computing the squared term (Aiken & West, 1991). We then computed a quadratic term for perceived time pressure (perceived time pressure-squared). The results of the regression analysis are shown in Table 2. As the results show (Table 2, model 1a), the coefficient

of perceived time pressure-squared is negative and significant ($\beta = -.13$, $p < .05$), providing support for hypothesis 1.

Hypothesis 2 predicted an inverted-U shape relationship between perceived time pressure and team processes that is moderated by team temporal leadership. The results of the moderated regression analysis predicting team processes are shown in Table 2. To reduce potential non-essential multicollinearity, we mean-centered perceived time pressure and team temporal leadership prior to computing the interaction terms (Aiken & West, 1991). The results in Table 2 (model 2a) show that inclusion of the interaction terms explained statistically significantly greater variance in team processes than the main effects model ($\Delta R^2 = .08$, $p < .01$). Further, the interactions between perceived time pressure and team temporal leadership ($\beta = .28$, $p < .001$) and perceived time pressure-squared and team temporal leadership ($\beta = .13$, $p < .05$) are significant. Following Aiken and West (1991), we probed the interaction effect by plotting the relationship between perceived time pressure and transition processes at one standard deviation above and one standard deviation below the mean for team temporal leadership. The interaction plot is shown in Figure 2.

INSERT FIGURE 2 ABOUT HERE

As the interaction plot in Figure 2 shows, when there is strong team temporal leadership, perceived time pressure is positively related to team processes. Thus the inverted-U shape relationship is attenuated. In contrast, under weak team temporal leadership, perceived time pressure has an inverted-U shaped relationship with team processes. The standard errors for non-linear slopes are difficult to interpret, making simple slope tests inappropriate in quadratic two-way interactions. Taken together, these results provide support for hypothesis 2.

Hypotheses on Moderated Indirect Effects of Perceived Time Pressure

In hypothesis 3, we proposed that the indirect effect of perceived time pressure on team performance through team processes would be moderated by team temporal leadership. In order to test this hypothesis, we first conducted moderated-mediation analysis following the guidelines of Edwards and Lambert (2007). In testing the indirect effects of perceived time pressure under weak versus strong team temporal leadership, we included both the linear and quadratic coefficients for perceived time pressure. Therefore, the estimated conditional indirect effects represent the general indirect effect of perceived time pressure on team performance. Table 3 reports the results of the analysis. We used bootstrapping to compute the standard errors of the direct and indirect effects, as well as the differences, under weak versus strong team temporal leadership. The significance levels are based on bias-corrected confidence intervals (Edwards & Lambert, 2007).

INSERT TABLE 3 ABOUT HERE

As the results in Table 3 show, the overall indirect effect of perceived time pressure on team performance is non-significant when team temporal leadership is strong ($\beta = .03$, $p > .10$). As we show next, this is likely because of the slight non-linearity of the relationship between perceived time pressure and team processes at low to intermediate levels. In contrast, perceived time pressure has a negative overall indirect effect on team performance through team processes ($\beta = -.10$, $p < .05$) when team temporal leadership is weak. Further, the difference between the indirect effects under weak versus strong team temporal leadership is significant ($p < .05$).

The moderated-mediation analysis conducted above provides a useful understanding of the general indirect effect of perceived time pressure on team performance (through the team

processes). However, because the relationship between perceived time pressure and the team processes is an inverted-U shape (particularly when team temporal leadership is weak), it is expected that the indirect effect will be positive for some values of perceived time pressure and negative for others. The moderated-mediation approach taken above does not provide any indication of this possibility of a quadratic relationship between the independent variable and the mediator. To test this non-linear indirect effect, we conducted a test of instantaneous indirect effects (Hayes & Preacher, 2010; Stolzenberg, 1980). Instantaneous indirect effects are predicated on the idea that if an independent variable (X) is non-linearly related to a mediator variable (M), then the indirect effect of X on the dependent variable (Y) cannot be represented by a single value (Stolzenberg, 1980). Rather, the indirect effects need to be estimated for specific values of X. This instantaneous indirect effect (θ_x) can be estimated by taking the first derivative of the function (the predictive equation) with respect to X.[3] Using this approach, we estimated instantaneous indirect effects for perceived time pressure on team performance (through team processes) under weak and strong team temporal leadership. Specifically, we estimated instantaneous indirect effects at low (one standard deviation below the mean), intermediate (mean), and high (one standard deviation above the mean) levels of perceived time pressure. Bootstrap analysis was conducted to construct bias-corrected confidence intervals for the estimates (Hayes & Preacher, 2010; Stine, 1989). These confidence intervals were used to determine if the instantaneous indirect effects were significantly different from zero. The results are shown in Table 4.

INSERT TABLE 4 ABOUT HERE
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[3] In our formulation, the equation for $\hat{Y}$ is given by $\hat{Y} = f(X) + (bM)(a_1X + a_2X^2 + a_3Z + a_4XZ + a_5X^2Z)$. $f(X)$ represents the direct effect and bM represents the indirect moderated-mediation effect.

Hypothesis 3 predicted that, under strong team temporal leadership, perceived time pressure would have a positive indirect effect on team performance (through team processes) at low to intermediate levels of perceived time pressure and a non-significant indirect effect at high levels. In contrast, under weak team temporal leadership, hypothesis 3 predicted that perceived time pressure would have a non-significant indirect effect on team performance (through team processes) at low levels and a negative indirect effect at intermediate to high levels. As the results in Table 4 show, when team temporal leadership is strong, perceived time pressure has a positive but non-significant indirect effect through team processes at low levels ($\theta_{x = 4.14} = .03$, $p > .10$), and a positive indirect effect at intermediate levels ($\theta_{x = 5.15} = .04$, $p < .05$) and high levels ($\theta_{x = 6.16} = .04$, $p < .05$). In contrast, when team temporal leadership is weak, perceived time pressure has a positive but non-significant indirect effect at low levels ($\theta_{x = 4.14} = .02$, $p > .10$), and a negative indirect effect at intermediate ($\theta_{x = 5.15} = –.14$, $p < .05$) and high ($\theta_{x = 6.16} = –.22$, $p < .05$) levels. This provides support for hypothesis 3.

Supplementary Analyses for Robustness

Taken together, the results of the analysis provide support for the hypotheses. We conducted several additional analyses to ensure the robustness of our results. First, we assessed the sensitivity of our results to the specific measurement points used in our analysis. Specifically, we used measures of perceived time pressure and team temporal leadership measured two weeks earlier than those used in our main analysis (i.e., before the project midpoint). The analysis revealed the same pattern of results. We also averaged the pre- and post-midpoint measures for perceived time pressure, team temporal leadership, and team processes. The results of this analysis are included in Appendix B and they show the same pattern of results. This suggests that our results are not sensitive to different measurement point specifications.

Although we focused on one overall team process variable in our analysis, Mathieu et al. (2006) suggested that it is worthwhile to observe the pattern of results for each individual team process as well. Therefore, we conducted a test of instantaneous indirect effects at strong versus weak team temporal leadership for team transition, action, and interpersonal processes separately. The results in Appendix C show an interesting pattern. The pattern of indirect effects of perceived time pressure, under weak team temporal leadership, is similar to that observed in our main analysis. In contrast, under strong team temporal leadership, the indirect effects through team transition processes differ a little bit from those through team action and interpersonal processes. Specifically, we see that while low to intermediate levels of perceived time pressure have a positive indirect effect through team transition processes, at high levels, perceived time pressure has a negative indirect effect through such processes. In contrast, for team action and interpersonal processes, perceived time pressure generally has a positive indirect effect, even at high levels.

DISCUSSION

This research sought to understand how perceived time pressure affects team performance and the role that team temporal leadership plays in shaping this relationship. Two underlying motivations were (1) the need to resolve inconsistencies in the theoretical treatment of, and empirical findings on, the relationship between perceived time pressure and team performance and (2) the desire to understand how temporal leadership enables teams to cope with perceived time pressure. To gain insight into these issues, this research drew on individual-level research on the non-linear effects of perceived time pressure and on temporal leadership theory. Our study results yielded three overarching findings that have implications for theory. First, perceived time pressure has an inverted-U shape relationship with team processes. Second,

the inverted U-shape relationship between perceived time pressure and team process is moderated by team temporal leadership. Finally, the indirect effect of perceived time pressure on team performance (through team processes) is non-linear and is moderated by team temporal leadership. Next, we discuss the implications of these findings for theory.

Theoretical Implications

This research makes an important contribution to theory on the effects of perceived time pressure on performance. At the outset, this research was motivated by the ambiguity that surrounds the link between perceived time pressure in teams and team performance. Various studies offered explanations for one relationship or another (e.g., positive, negative), but there was limited, if any, theoretical investigation that provided an integrative explanation of when and why these different effects emerge. Our consideration of the non-linear effect of perceived time pressure, the team processes it affects, and the moderating role of team temporal leadership provides a more complete explanation for the mixed findings in prior research. By showing that perceived time pressure can have positive or inverted U-shape effects depending on team temporal leadership, the findings challenge conventional notions about the theoretical treatment of perceived time pressure as implied in various theoretical frameworks, such as the challenge-hindrance stressor framework (Cavanaugh et al. 2000; LePine et al. 2005). Rather than considering whether perceived time pressure is inherently good or bad for performance, our research suggests that it would be more informative for theory to focus on explaining the circumstances under which perceived time pressure has a negative versus positive influence and why (Mitchell & James, 2001). An inquiry would provide critical insight at the individual and team levels of analysis.

Another important contribution of this research is in advancing the broader literature on time in teams (Mohammed, Hamilton, & Lim, 2009). Numerous researchers have called for a more explicit theoretical treatment of time in teams and particular attention has been drawn to the need to account for the role of time as part of the general context (Mohammed et al., 2009). This research goes beyond simply accounting for time as part of the context in which teams operate. It provides a better theoretical understanding of the mechanism by which perceived time pressure affects performance outcomes. Although McGrath's (1991) time, interaction, and performance (TIP) theory and Gersick's (1988) punctuated equilibrium model suggested that multiple facets of team functioning may be affected by temporal conditions in the task environment, a majority of empirical research tends to focus on a narrow loci of activities. Our research underscores the importance of examining the broader range of task management activities, embodied in team processes, when studying the effects of perceived time pressure. Further, the results of the supplemental analysis indicate subtle differences in effects across these team processes. In examining the effects on team processes, this research attends to the disruptions and motivations that time pressure creates in affecting the management of interdependent tasks in teams through planning, coordination, and interpersonal issues.

A final major contribution of this research is in expanding theory on the role of leadership in managing the temporal issues that affect team functioning (Mohammed & Nadkarni, 2011; Morgeson & DeRue, 2006; Morgeson et al., 2010). Extant theory on the role of leadership in managing the interface between perceived time pressure (as an element of the task environment) and team functioning has been quite limited (Bluedorn & Jaussi, 2008). By considering team temporal leadership, this research expands the theoretical role of leadership to include enabling teams to function effectively when experiencing perceived time pressure. As

such, it highlights a more active role for leadership in shaping how teams respond to perceived time pressure than has previously been recognized in the literature. This research also suggests that leadership can play an active role in drawing teams' attention to temporal issues even when such issues are less salient (Gersick, 1988). As temporal issues take an increasingly prominent role in theorizing about teams, consideration of temporal leadership clearly needs to be an important part of the ongoing conversation.

Limitations and Directions for Future Research

Our study has a few limitations that must be acknowledged. Our measure of team processes only offered a cross-section in time and did not account for the temporal ordering of these processes. As we noted earlier, Marks et al.'s (2001) taxonomy suggests that within each task performance episode, transition processes precede action processes. Our study design measured team processes at multiple points in time during each project and there were no notable differences in our results when including transition processes measured at an earlier time. However, owing to the complexity of the field setting in which the project tasks were numerous and varied, it was difficult to capture such data at the level of the individual task, which is precisely where such temporal ordering is relevant (Marks et al., 2001). This is often a challenge in field settings and our approach to measuring team processes is consistent with prior field research that has sought to measure these processes (e.g., Mathieu et al., 2006). This does not diminish the value of our findings as our primary interest was in the impact of perceived time pressure on team processes. Nevertheless, there is value to be gained from research that can measure multiple task performance episodes and can capture the nuances associated with the temporal ordering of transition versus action processes at the level of individual tasks.

Our focus in this research was on perceived, rather than actual, time pressure. This creates the potential for incongruence between perceptions of time pressure and actual time pressure. However, in this research, we reasoned that teams' actions are based on their perceptions of the task environment and the clearly defined project deadlines make it unlikely that there would be a high level of incongruence with respect to actual time pressure. Nevertheless, actual time pressure remains an important aspect of the task environment (Mohammed et al., 2009). An implication of this focus on perceived time pressure is that our findings must be interpreted with caution, particularly as related to research where actual time pressure is experimentally manipulated (e.g., Karau & Kelly, 1992; Waller et al., 2002). Future research is needed to examine whether the effects of actual time pressure on team processes vary as a function of team temporal leadership.

By focusing on perceived time pressure, there is also the potential for reverse causality in the hypothesized relationships. It could be argued that team temporal leadership should reduce perceived time pressure by, for example, setting aside time for unforeseen temporal contingencies or synchronizing team member actions to build a temporal cushion within a fixed deadline. This could reduce the time pressure felt by team members. However, theory suggests that this is unlikely to be the case in our context. Specifically, Gersick (1988), Waller et al. (2002) and others find that teams with stable deadlines, as was the case in our study, pay attention to the actual time and are prompted to act when deadlines draw near. This increases the likelihood of perceived time pressure emerging because by delaying action until deadlines loom, the perception of time scarcity is created. In a field setting such as ours, the nature of the teams' work involves multiple overlapping project milestones for various tasks, leading teams to feel they are under time pressure. Under such a scenario, team temporal leadership is unlikely to

reduce perceptions of time scarcity. As we have argued, team temporal leadership improves teams' capacity to handle their responsibilities under such perceived time pressure, thus, shaping their resulting processes.

Managerial Implications

The above limitations notwithstanding, our research has important implications for practice. First, as our findings suggest, some degree of perceived time pressure is beneficial for motivating teams to engage in team processes that facilitate performance. As such, managers are advised to underscore temporal constraints to their teams and to do so early enough during task performance that the teams involved have sufficient time to act accordingly. This will ensure greater task engagement, as teams develop a sense of mission, while also giving teams a realistic chance of completing their objectives (Amabile et al., 2002). Managers must exercise caution against either waiting too long to direct their teams' attention to temporal constraints or creating a sense of panic regarding such constraints as this can be debilitating to teams. When teams feel as though temporal constraints are too severe, they are likely to respond by abandoning the very processes that are important for achieving objectives.

Second, as the results regarding the moderating role of team temporal leadership show, managers have an active role to play in enabling their teams to handle the time pressure they experience. Given their high level view of teams' task status, task environment and task objectives, managers are well-positioned to provide guidance about how to manage temporal resources under existing constraints (Morgeson & DeRue, 2006). Under the very task conditions that prompt teams to abandon team processes (Gersick, 1988), our research shows that managers can intervene to re-orient team members' efforts toward effective task management through

scheduling of interim milestones, synchronization of tasks and restructuring of priorities. These efforts result in higher team performance.

Finally, project teams are assembled on the basis of needed and available expertise. As such, team members are often not trained to manage their temporal resources. To the extent possible, managers are advised to devote part of the early stages of task execution to developing their teams' capability to manage temporal resources. Building such capabilities early on can pay dividends at later task stages, when temporal constraints increase, as teams will be equipped to handle such issues on their own (Gevers et al., 2006; Gevers et al., 2009).

CONCLUSION

In this research, we sought to resolve the inconsistent findings regarding the effects of perceived time pressure on team performance. This was accomplished by drawing on, and integrating, the perceived time pressure and team temporal leadership literatures. The findings in this research advance theory by identifying the mediating mechanisms through which perceived time pressure influences performance in project teams and showing that team temporal leadership plays a significant role in determining how such pressure affects team functioning. These findings lend insight into how we should think about perceived time pressure and its effects in organizational settings.

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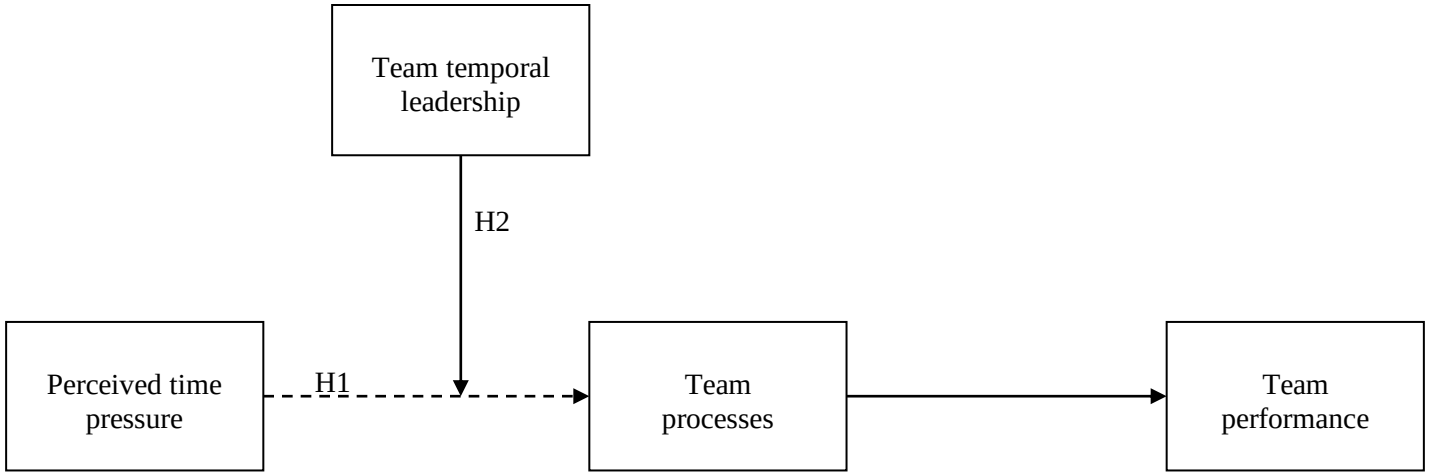
FIGURES

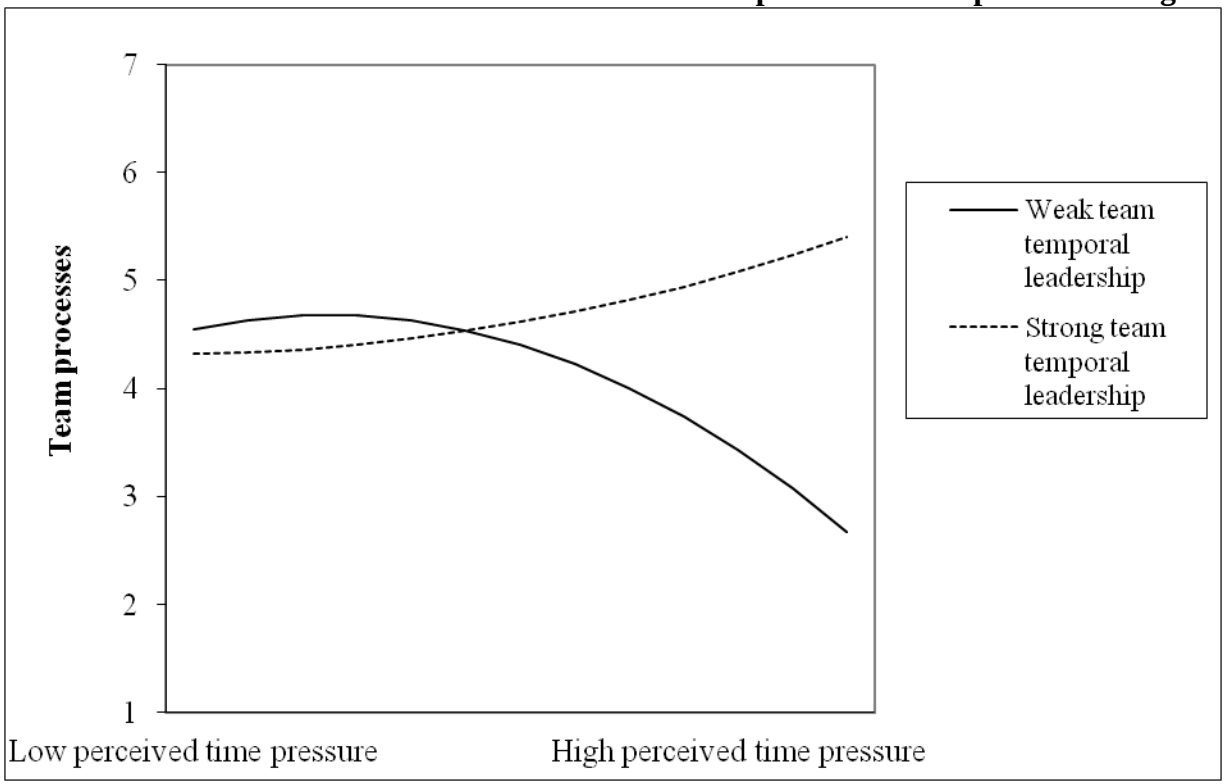
FIGURE 1
Hypothesized Model of Perceived Time Pressure and the Moderating Role of Team Temporal Leadership



H3: Non-linear indirect effect on team performance through team processes

Inverted-U shape relationship

FIGURE 2
Plot of Interaction between Perceived Time Pressure and Team Temporal Leadership in Predicting Team Processes



TABLES

TABLE 1
Correlations and Descriptive Statistics[a]

Variable	Mean	s.d.	1	2	3	4	5	6
1. Team performance (T3)	4.17	1.41	(.82)					
2. Team processes (T2)	4.51	1.25	.26***	(.71)				
3. Team temporal leadership (T1)	4.41	1.74	.19**	.22***	(.77)			
4. Perceived time pressure (T1)	5.15	1.01	-.28***	-.26***	-.17**	(.80)		
5. Team tenure (years)	1.07	0.55	.24***	.09	.07	-.13*		
6. Team size	11.51	2.17	-.17**	-.12*	.10	.07	.15*	
7. Average project experience (years)	4.35	2.80	.26***	.13*	.08	-.17**	.19**	.15*

[a] n = 111 teams representing 1115 team members. Values on diagonal are individual-level Cronbach's alpha. T1 = time 1, T2 = time 2, T3 = time 3.

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 2
Results of Moderated Regression Analysis Predicting Team Processes and Team Performance[a]

	Team processes (T2)		Team performance (T3)		
Model #	1a	2a	1b	2b	3b
Team tenure	.06	.05	.12*	.12*	.09
Team size	–.07	–.06	–.10	–.08	–.07
Average project experience	.06	.05	.15*	.13*	.12*
Perceived time pressure (std dev)	.18**	.15*	–.12*	–.11*	–.08
Perceived time pressure (T1)	–.15*	–.13*	–.14*	–.13*	–.11*
Perceived time pressure–squared	–.13*	–.12*	–.20**	–.17**	–.15*
Team temporal leadership (T1)	.08	.06	.16**	.15*	.13*
Team processes (T2)					.24***
Perceived time pressure x team temporal leadership		.28***		.15*	.16**
Perceived time pressure–squared x team temporal leadership		.13*		.29***	.25***
Adjusted R^2	.08	.16	.12	.22	.29
ΔR^2		.08**		.10***	.07**

[a] n = 111 teams. Standardized coefficients are shown. T1 = time 1, T2 = time 2, T3 = time 3.
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 3
Results of Moderated-Mediation Analysis Predicting Team Performance[a]

		DV: Team performance (T3)		
Mediator	Level of Moderator	Direct Effect	Indirect Effect	Total Effect
Team processes (T2)	Strong (+1SD)	.27*	.03	.30*
	Weak (–1SD)	–.57**	–.10*	–.67**
	Differences	.84**	.13*	.97**

[a] Coefficients are based on 1,000 bootstrap estimates; tests of differences are based on bias-corrected confidence intervals from bootstrap estimates. Estimates of direct effects are based on ($b_{X6} + b_{X^2 6} + b_{XZ6}Z + b_{X^2 Z6}Z$) and estimates of indirect effects are based on ($[a_{X5} + a_{X^2 5} + a_{XZ5}Z + a_{X^2 Z5}Z]b_{M6}$). In all analyses, perceived time pressure (T1) (linear and squared term) is the independent variable and team temporal leadership (T1) is the moderator. T1 = time 1, T2 = time 2, T3 = time 3.

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 4
Instantaneous Indirect Effects (θ_x) of Perceived Time Pressure (T1) on Team Performance (T3)[a]

		Level of perceived time pressure (T1)		
Mediator	Level of Moderator (T1)	Low	Intermediate	High
Team processes (T2)	Strong (+1SD)	.03	.04*	.04*
	Weak (–1SD)	.02	–.14*	–.22*

[a] Coefficients are based on 1,000 bootstrap estimates. Estimates of instantaneous indirect effects based on $\theta_x = [(2a_5x + a_4)z + 2a_2x + a_1]b$; where x = perceived time pressure, z = team temporal leadership and b = the coefficient of the mediator in predicting team performance. T1 = time 1, T2 = time 2, T3 = time 3.

* $p < .05$
** $p < .01$
*** $p < .001$

APPENDIX A

Measurement Scales Used in Study

Team Performance: (1 = Strongly disagree; 7 = Strongly agree)
1. The client perceives that the system meets intended functional requirements.
2. The overall quality of the developed system is high.
3. The system was completed within budget.
4. The system was completed within schedule.

Perceived Time Pressure: (1 = Strongly disagree, 7 = Strongly agree)
1. We are often under a lot of pressure to complete our tasks on time.
2. We are not afforded much time to complete our tasks.
3. The amount of time provided to complete our tasks is short.
4. Task durations are often short.

Team Temporal Leadership: (1 = Not at all, 5 = A great deal)
1. To what extent does your team leader remind members of important deadlines?
2. To what extent does your team leader prioritize tasks and allocate time to each task?
3. To what extent does your team leader prepare and build in time for contingencies, problems, and emerging issues?
4. To what extent does your team leader pace the team so that work is finished on time?
5. To what extent does your team leader urge members to finish sub-tasks on time?
6. To what extent does your team leader set milestones to measure progress on the project?
7. To what extent is your team leader effective in coordinating the team to meet customer deadlines?

Team Transition Processes: (1 = Strongly disagree; 7 = Strongly agree)
Members of this team discuss…
1. Our performance vision.
2. Specific milestones for achieving our objectives.
3. Specific timelines for accomplishing tasks.
4. What we can do to make our performance vision a reality.
5. Which goals and sub-goals to prioritize in order to accomplish our work.
6. Our team's objectives.
7. Alternative ways of achieving our objectives.

Team Action Processes: (1 = Strongly disagree; 7 = Strongly agree)
Members of this team…
1. Take the time we need to share task-related information.
2. Track our progress toward achieving our goals.
3. Track our progress toward completing tasks.
4. Try to understand what needs to be done to accomplish our goals.
5. Actively learn from one another.
6. Track team resources that relate to our goal accomplishment.

7. Track events/decisions in the organization that affect our ability to accomplish our goals.
8. Effectively communicate with each other throughout each week.
9. Help each other out with completing tasks.
10. Give each other feedback on task performance.
11. Back each other up when a task needs to be completed.

Team Interpersonal Processes:
Over the course of this project…
Task conflict: (1 = Not at all; 7 = All of the time)
1. How frequently have you dealt with conflicts about the project in your team?
2. How often have members of your team managed disagreements about opinions regarding how to complete the project?
3. How often have you managed clashes about task matters on the project?

Affective conflict: (1 = None; 7 = A great deal)
Over the course of this project…
1. How much have you managed friction among members of your project team?
2. How much have you managed personality conflicts between team members during the project?
3. How much have you dealt with tension among members of your project team?
4. How much have you managed emotional conflict among members of your project team?

Trust: (1 = Strongly disagree; 7 = Strongly agree)
Members of my team…
1. have created an environment of openness and trust.
2. really trust each other.
3. think in terms of what is best for the team.

APPENDIX B

Results of Moderated Regression Analysis using Variables Average Across all Time Periods

	Team processes		Team performance		
Model #	1a	2a	1b	2b	3b
Team tenure	.07	.04	.12*	.11*	.07
Team size	–.09	–.05	–.11*	–.09	–.06
Average project experience	.05	.04	.14*	.12*	.11*
Perceived time pressure (std dev)	.17**	.14*	–.13*	–.10	–.05
Perceived time pressure	–.13*	–.12*	–.14*	–.12*	–.10
Perceived time pressure–squared	–.12*	–.11*	–.21***	–.18**	–.14*
Team temporal leadership	.06	.03	.14*	.14*	.12*
Team processes					.25***
Perceived time pressure x team temporal leadership		.25***		.13*	.14*
Perceived time pressure–squared x team temporal leadership		.12*		.30***	.28***
Adjusted R^2	.07	.14	.13	.23	.31
ΔR^2		.07**		.10***	.08**

[a] n = 111 teams. Standardized coefficients are shown. Scores for perceived time pressure, team processes, and team temporal leadership variables are averaged across all measurement time periods.

* $p < .05$
** $p < .01$
*** $p < .001$

APPENDIX C

Instantaneous Indirect Effects (θ_x) of Perceived Time Pressure (T1) on Team Performance (T3)[a]

		Level of perceived time pressure		
Mediator	Level of Moderator	Low	Intermediate	High
Team transition processes (T2)	Strong (+1SD)	.05*	.00	–.04*
	Weak (–1SD)	.03*	–.04*	–.11*
Team action processes (T2)	Strong (+1SD)	.00	.02*	.02*
	Weak (–1SD)	.00	–.05*	–.10*
Team interpersonal processes (T2)	Strong (+1SD)	.02*	.02*	.02*
	Weak (–1SD)	.02*	–.05*	–.11*

[a] Coefficients are based on 1,000 bootstrap estimates. Estimates of instantaneous indirect effects based on $\theta_x = [(2a_5x + a_4)z + 2a_2x + a_1]b$; where x = perceived time pressure, z = team temporal

leadership and b = the coefficient of the mediator in predicting team performance. T1 = time 1, T2 = time 2, T3 = time 3.
* $p < .05$.