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Research Article

The impact of team familiarity and team leader experience on team coordination errors: A panel analysis of professional basketball teams

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Summary To explore the dynamics involved in team coordination, we examine the impact of team familiarity and team leader experience on team coordination errors (TCEs). We argue that team familiarity has a U-shaped effect on TCEs. We study the moderating effects of team leader prior experience and team leader team-specific experience on the association between team familiarity and TCEs. We use panel data on teams from the National Basketball Association to test the hypotheses. Our findings support the U-shaped relationship between team familiarity and TCEs and the moderating effect of team leader team-specific experience on this relationship. The paper advances research on errors in organizations by analyzing the antecedents of TCEs, so far an underexplored empirical phenomenon. Moreover, it contributes to research on coordination in teams by empirically examining the interplay between formal and informal coordination mechanisms. Copyright © 2015 John Wiley & Sons, Ltd.

Keywords: coordination; error; team familiarity; team leader

Errors are costly and impair safety, reliability, and productivity in organizations (see, e.g., Hofmann & Frese, 2011; Ramanujam, 2003; Reason, 1990; Zhao, 2011; Zhao & Olivera, 2006). Organizations often spend significant resources and effort to avoid errors, which can occur at different levels (e.g., individual, team/group, or organization). In this paper, we focus on errors at the team level because modern work is complex and often performed in teams (DeShon & Gillespie, 2005; Kozlowski & Bell, 2003). In particular, we examine team coordination errors (TCEs); that is, instances where team coordination fails.

Errors involve an *unintended* deviation from a desired state, which "may lead to actual or potential negative consequences for organizational functioning that could have been avoided" (Zhao & Olivera, 2006, p. 1013). Consistent with this definition, we argue that errors imply the non-attainment of a goal (Zapf & Reason, 1994), an artifact of failed goal-oriented effort (i.e., TCEs result from failed effort). Hence, errors of omission (e.g., when a team member is supposed to coordinate with another member but does not even try) are beyond the scope of our discussion. Although research has examined individual errors in work settings, little work has been carried out to study errors that occur at the team/group level when team members' interdependent efforts are integrated (Bell & Kozlowski, 2011; Hofmann & Frese, 2011). We aim to fill this gap, acknowledging that TCEs represent a significant proportion of the errors that occur in teams (Kern, 1995; Thornton & Zeller, 1991). TCEs also seriously affect the performance of teams and organizations, especially in highly task-interdependent contexts (Kern, 1995; Leedom & Simon, 1995; Thornton & Zeller, 1991).

To examine factors and mechanisms involved in the occurrence of TCEs, we draw on the literature on coordination in teams and organizations (e.g., Bechky, 2006; Okhuysen & Bechky, 2009; Rico, Sanchez-Manzanares, Gil, &

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Gibson, 2008). Research has suggested that both formal and informal mechanisms should be considered when studying coordination (Okhuysen & Bechky, 2009). A review of prior work reveals that team familiarity (i.e., team members' shared experience working together; Espinosa, Slaughter, Kraut, & Herbsleb, 2007; Reagans, Argote, & Brooks, 2005) is a highly relevant mechanism for capturing the informal practices that contribute to team coordination and performance (e.g., Espinosa et al., 2007; Okhuysen, 2001; Taylor & Greve, 2006). Coordination mechanisms include both formal and informal elements (Mintzberg, 1979); team familiarity captures the informal elements because it is closely tied to the temporally unfolding and iterative process of interaction between members (Okhuysen & Bechky, 2009). Previous studies have found that team familiarity positively contributes to team performance (see, e.g., Cooke, Gorman, Duran, & Taylor, 2007; Huckman, Staats, & Upton, 2009; Reagans et al., 2005), presumably through improved team coordination. Although the association between team familiarity and team performance has been well researched, little work has been carried out to empirically examine the direct link between team familiarity and team coordination. This leaves a significant research gap, particularly in light of a recent review of the coordination literature that revealed that team familiarity is involved in the creation of all the integrative conditions for coordinated activity (Okhuysen & Bechky, 2009). Moreover, research on errors has also assumed that team familiarity influences error rates in teams, with more familiar teams committing fewer errors (Weick & Roberts, 1993). However, no studies have empirically tested this assumption, owing to a lack of reliable error data (e.g., Edmondson, 1996). We aim to fill this gap by examining the impact of team familiarity on TCEs. In particular, we hypothesize a U-shaped relation between team familiarity and TCEs. Moderate team familiarity might provide an optimal level of heedful coordination in a dynamic task environment, which, in turn, might reduce TCEs and lead to optimal integration of team member contributions for achieving common goals. Too much familiarity, however, might encourage teams to develop habitual routines (Gersick & Hackman, 1990). Over time, such routines result in heedless implicit coordination, which might increase TCEs, particularly when handling dynamic tasks.

To examine the formal aspect of coordination, we study the role of team leaders, an important part of the formal coordination structure in organizations (e.g., Zaccaro, Rittman, & Marks, 2001). One of the fundamental tasks of team leaders is to coordinate and integrate team members' interdependent work, primarily by setting rules and plans (see, e.g., Bechky & Okhuysen, 2011; Klein, Ziegert, Knight, & Xiao, 2006; Morgeson, DeRue, & Karam, 2010). Team leaders, like team familiarity, influence all the integrating conditions for coordination (Okhuysen & Bechky, 2009). Team leaders' knowledge, skills, and abilities (KSAs) to integrate interdependent efforts increase with their years of leadership experience as they become better at doing their jobs (Mumford, Marks, Connelly, Zaccaro, & Reiter-Palmon, 2000). Team leader experience captures team leaders' influence on teams over time. This refers to the purposive, formal elements involved in coordination because team leaders (like managers) are responsible for establishing formal structures (e.g., procedures, rules, plans, and policies) in team processes (Okhuysen & Bechky, 2009). Therefore, in this study, we also investigate the impact of team leader experience on TCEs. Specifically, we focus on the moderating effect of team leader experience on the link between team familiarity and TCEs; prior work (Okhuysen, 2001; Okhuysen & Bechky, 2009) has revealed that the interaction between formal and informal coordination activities significantly affects dynamics and patterns in team coordination. We expect that, compared with less experienced team leaders, more experienced team leaders will more effectively intervene in team processes once they have detected TCEs (Morgeson, 2005). Therefore, experienced team leaders can reduce the detrimental effect of too much familiarity among team members and moderate the U-shaped relation between team familiarity and TCEs.

We use panel data on teams from the National Basketball Association (NBA) to test all the hypotheses. Basketball is an ideal context for investigating TCEs because it is a sport in which team members are highly interdependent (Timmerman, 2000). Moreover, what constitutes "errors" in the NBA does not change across teams or over time, which assures the reliability of the data and enables us to examine the occurrence of TCEs over time at the team level. In addition, the reliability and validity of our TCE data are higher than those of self-reported data from team members because data on TCEs in the NBA are based on objective measures collected by NBA statisticians.

This study advances research in several ways. First, it contributes to research on errors and error management by focusing on the factors that affect the occurrence of TCEs. Despite extensive research on errors in organizations (see,e.g., Carmeli & Gittell, 2009; van Dyck, Frese, Baer, & Sonnentag, 2005; Edmondson, 1996; Haunschild & Sullivan, 2002; Tjosvold, Yu, & Hui, 2004), limited work has been carried out to investigate the predictor variables that explain how and when errors occur at the team level. Our research complements prior work on individual errors in organizations because TCEs are a different category of workplace errors. Teams experience both individual and collective errors (see, e.g., Bell & Kozlowski, 2011; Sasou & Reason, 1999). Individual errors in teams are defined as errors committed by individuals "without the participation of any other team member" (Sasou & Reason, 1999, p. 2). This type of error is similar to the individual errors that occur outside of teams, which can be explained by intra-personal factors (van Dyck et al., 2005; Helmreich, 2000).

By contrast, TCEs are collective errors. The cause of TCEs lies in the inter-individual interaction process rather than the intra-individual process (Bell & Kozlowski, 2011; Hofmann & Frese, 2011). TCEs occur in the dynamic and interdependent interactions of team members. For example, Weick (1990) found that misunderstandings, and resultant TCEs between pilots and air traffic controllers, were crucial contributing factors to a mid-air collision that cost 583 lives. Similarly, Hirokawa, Gouran, and Martz (1988) found that the ambiguous language used among crew members and resultant TCEs led to the 1986 Challenger disaster.

Second, our study contributes to research on the influence of team familiarity on team performance by examining the direct link between team familiarity and team coordination. This association has been assumed but not empirically studied (see, e.g., Espinosa et al., 2007; Reagans et al., 2005).

Third, we extend the literature on team coordination (e.g., Harrison & Rouse, 2014). As team members get used to working together, they increasingly rely on informal coordination to integrate their efforts towards a common goal (Rico et al., 2008). Team leaders, in contrast, tend to use formal coordination mechanisms to align team members' interdependent activities (Edmondson, 2003; Hackman, 1993; Hackman & Wageman, 2005a; Zala-Mezö, Wacker, Künzle, Brüesch, & Grote, 2009). Previous studies (e.g., Espinosa et al., 2007; Huckman et al., 2009) have tended to concentrate on informal coordination mechanisms, such as team familiarity. By investigating how team leader experience moderates the influence of team familiarity on TCEs, this study furthers our understanding of the interaction between formal and informal coordination mechanisms and its effects on TCEs over time.

Theory and Hypotheses

Team familiarity and team coordination errors

Team coordination has been defined as the integration of team members' work inputs (e.g., actions, knowledge, and objectives) for the purpose of achieving common goals (Faraj & Xiao, 2006, p. 1156). TCEs—failed coordination—impair team effectiveness and performance (Huckman et al., 2009; Reagans et al., 2005). Therefore, it is important for us to understand why TCEs occur. In this section, we focus on the influence of team familiarity, which captures the informal coordination mechanism (Okhuysen, 2001; Okhuysen & Bechky, 2009).

Team familiarity is defined as team members' shared experience working together (Huckman et al., 2009; Reagans et al., 2005). Research has suggested that team familiarity significantly enhances team performance by improving team member coordination. For instance, Reagans and colleagues (2005) found that hospital surgeons who had more experience operating together completed procedures faster than surgeons with less experience because they were better able to coordinate their actions. Similarly, Huckman et al. (2009) showed that team familiarity enhanced the performance of software teams because team members who had worked together were adept at managing their interdependencies.

We argue that the relationship between team familiarity and TCEs is best represented by a U-shape where the bottom of the curve is the optimal level of team familiarity to minimize TCEs. As team familiarity increases towards

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the bottom of the curve, it helps to contain TCEs. But when team familiarity passes beyond the optimal point, it serves to increase TCEs when teams confront and handle challenges of novel events and unplanned contingencies.

Team coordination errors initially decline as team familiarity increases because team members have gained more knowledge of each other and of the task, which leads to heedful implicit coordination. Support for this argument abounds in the literature on transactive memory systems (e.g., Brandon & Hollingshead, 2004), team mental models (e.g., Weick & Roberts, 1993), and cross-understanding (e.g., Huber & Lewis, 2010). For example, team mental model theory suggests that the experience of working collectively and cooperatively contributes to both the *sharedness* and *accuracy* of team member mental models over time. Shared team knowledge models emerge through interaction dynamics and processes as team members get to know the expertise, needs, and expectations of their colleagues (Cannon-Bowers & Salas, 2001; Espinosa et al., 2007; Mathieu, Goodwin, Heffner, Salas, & Cannon-Bowers, 2000; Mohammed, Ferzandi, & Hamilton, 2010). Coordination improves to the extent that team members share their knowledge structures (Rico et al., 2008), which results in fewer TCEs. The accuracy of team knowledge models also builds up as team members become familiar with each other. In the early stage, team members are well aware of the need to establish, modify, and expand their shared team knowledge models, and thus they will actively and attentively do so as they work together. Team members' knowledge about each other and the task setting improves and converges with time, as a result of heedful information searching, processing, sharing, and integration. Shared and accurate team knowledge models enable members to anticipate one another's actions and heedfully interrelate their contributions during a collective undertaking (Weick & Roberts, 1993). "As heedful interrelating increases, then, organizational members' understanding of unfolding events improves and errors decrease" (Rico et al., 2008, p. 166).

Once past the optimal point, we expect that further increments in team familiarity will increase TCEs when *ad hoc* coordination is demanded in response to dynamic tasks or novel contingencies in the task environments. This argument is consistent with previous studies suggesting that too much team familiarity actually undermines team performance when teams are challenged to adapt to a changing environment (see, e.g., Berman, Down, & Hill, 2002; Katz, 1982). For example, research has suggested that over-familiar teams are less likely to self-interrupt or explore new possibilities, negatively impacting their ability to handle dynamic tasks (Wiersema & Bantel, 1993). This phenomenon can be explained by heedless implicit coordination. When team members work together long enough, they develop habitual routines (Gersick & Hackman, 1990) that might be good for dealing with routine tasks but are insufficient for handling unpredictable or dynamic tasks (e.g., Gorman, Amazeen, & Cooke, 2010; Rico et al., 2008; Wiersema & Bantel, 1993). Over time, such habitual routines encourage heedless implicit coordination that makes it hard for team members to adapt to change owing to rigid, almost automatic, cognitive and behavioral responses (Edmondson, Bohmer, & Pisano, 2001; Gersick & Hackman, 1990). When flexibility and adaptability are required in response to a changing task environment, team members still apply established habitual routines that are no longer appropriate. Particularly, heedless implicit coordination erodes the accuracy of shared team situation models (i.e., "dynamic, context-driven models concerning key areas of the team's work"; Rico et al., 2008, p. 164). Team members who rely on habitual functioning pay less attention to the vigilant information processing and exchange that is essential for handling ill-defined, non-routine tasks; for instance, they no longer carefully explore and evaluate alternative actions. Consequently, team members fail to refine and update their knowledge on the current task situation when facing dynamic and uncertain contingencies (Gorman et al., 2010), increasing the probability that problems and errors will occur as members try to coordinate and manage their multiple interdependencies. This hypothesized association between too much familiarity and TCEs has not been empirically studied but receives indirect supporting evidence from an experimental study conducted by Gorman and colleagues (2010). These authors observed the team coordination dynamics of 39 teams in an uninhabited air vehicle synthetic task environment (using an uninhabited air vehicle simulator) and found that unfamiliar teams exhibited greater flexibility and adaptability than familiar teams and thus coordinated more effectively when performing highly dynamic tasks. However, familiar teams coordinated better than unfamiliar teams on routine tasks. Hence, we argue that, although team familiarity reduces TCEs in the short run, it increases TCEs in the long run when handling dynamic tasks.

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Hypothesis 1: There is a U-shaped relation between team familiarity and TCEs. TCEs will decrease when team familiarity initially increases; once past the optimal point, further increase in team familiarity leads to increased TCEs.

The moderating effect of team leader experience on the U-shaped relation between team familiarity and team coordination errors

A team leader is often the only person who sees the "whole picture" in a team (Edmondson, 2003). Team leaders are part of the formal coordination structure and are often responsible for defining the team's vision, strategy, and processes (Kozlowski, Gully, Salas, & Cannon-Bowers, 1996; Morgeson et al., 2010; Salas, Burke, & Samman, 2001) and guiding members to coordinate their interdependent work, primarily via explicit mechanisms such as setting rules, planning, and overt communication (Edmondson, 2003; Hackman, 1993; Hackman & Wageman, 2005a; Zala-Mezö et al., 2009). Moreover, a team leader also monitors the team and is supposed to intervene in team processes if team performance declines (e.g., Edmondson, 2003; Gersick & Hackman, 1990; Morgeson, 2005). For instance, a team leader might introduce and establish new rules and routines to address performance problems or to prepare the team for emerging challenges (e.g., Edmondson et al., 2001; Klein et al., 2006).

However, team leaders' ability to identify inappropriate team routines and improve them via formal, explicit coordination mechanisms is likely to be affected by their leadership experience (DeRue & Wellman, 2009; Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000). We argue that team leaders accumulate leadership-specific KSAs over time (Argote & Miron-Spektor, 2011) and become better at using explicit coordination mechanisms to manage and improve team members' coordination and to reduce TCEs (Avery, Tonidandel, Griffith, & Quinones, 2003; Bettin & Kennedy, 1990). For example, team leaders might learn from experience how to better manage task interdependencies among team members, how to better communicate with the individuals on their teams, and how to better recognize early signs of problematic team routines (Hackman & Wageman, 2005b). This experience enables them to successfully intervene when they detect suboptimal practices and routines and introduce new or improved practices that help team members better coordinate their actions (Edmondson, 2003; Morgeson, 2005). Therefore, we expect a less pronounced U-shaped relationship between team familiarity and TCEs in teams that are led by highly experienced team leaders, whereas we expect a more pronounced U-shaped relationship in teams that are led by team leaders with less experience, because the latter lack the leadership-related KSAs required for identifying and changing inappropriate routines.

The leadership literature has examined two different types of leadership experience: team leader prior leadership experience (i.e., the amount of leadership experience gained before joining the current team/organization) and team/organization-specific leadership experience (i.e., the amount of leadership experience gained in the current team/organization; e.g., Giambatista, 2004). A general argument from this line of research is that a leader joining a new team or organization needs to understand the new context, such as the organizational culture, structure, goals, processes, and membership. This type of contextual knowledge, like relevant prior experience, affects leadership effectiveness (Mumford, Zaccaro, et al., 2000). For instance, culture influences which leadership approach will be acceptable and desirable in a certain team/organization, thereby affecting the team leader's decisions and actions. We follow previous research (e.g., Giambatista, 2004) and separately examine team leader prior leadership experience and team-specific leadership experience (given that our data is on NBA teams). To summarize:

Hypothesis 2a: Team leader prior leadership experience negatively moderates the U-shaped relation between team familiarity and TCEs, such that the U-shape is less pronounced as the amount of leader prior leadership experience increases.

Hypothesis 2b: Team leader team-specific leadership experience negatively moderates the U-shaped relation between team familiarity and TCEs, such that the U-shape is less pronounced as the amount of leader team-specific leadership experience increases.

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Research Methods

Data

Professional basketball teams are an ideal context for studying TCEs. To work together as a team, the five players on the court need to dynamically anticipate, adjust, and integrate their task inputs to attain the common goal. The data used for hypothesis testing were collected on all 30 teams that competed in the NBA from the 2002/2003 season through the 2010/2011 season. This period of time was chosen because of the availability of data on TCEs. Data were collected on each team for each season; however, three observations on the Charlotte Bobcats are missing because this team entered the NBA in 2004/2005. Therefore, the final sample consists of 267 observations. All the data except TCEs were collected from the official NBA website (www.nba.com). The data on TCEs were obtained from 82games.com, a private website that provides in-depth statistics on the NBA. We used 82games.com data because the NBA only publishes official statistics on the total number of turnovers (i.e., when a team loses the ball), of which TCEs are one category, and no separate statistics on the number of TCEs for each team. To confirm the reliability of the data from 82games.com, we compared the total number of turnovers collected from the official NBA website with that from 82games.com. We found that, on average, 82games.com reports 2.82 fewer turnovers per team per season than does the official NBA website. The deviation between the two websites is only about 0.24%.[1] Therefore, we do not expect the data collected from 82games.com to differ significantly from the official NBA statistics, and thus these data can be used for research purposes.

Dependent variable

In general, passes represent one of the most important interactions among basketball team members. A successful pass requires coordination between the passer and the receiver; the player with the ball has to correctly anticipate his or her teammate's movement on the court. Unsuccessful passes are failed intended coordination between the players and are a good indicator of TCEs. In the NBA, unsuccessful passes are called bad passes. NBA statisticians register a bad pass if the offensive team loses ball possession because a pass either goes out of bounds or is intercepted by an opponent. However, a bad pass is not registered if the receiver fails to catch the ball because of his or her own mistake or if the ball goes out of bounds because of the passer's own mistake (Fédération Internationale de Basketball, 2005). This is important for our research purpose because it means that bad passes stand for coordination failure between players, not individual errors (i.e., mistakes attributed to one single player only). A ball-handling error, on the other hand, indicates an individual error because it is registered when a player loses ball possession while holding or dribbling the ball or when a player fails to catch a pass. In other words, bad passes represent instances in which the ball is lost in inter-individual interactions, whereas ball-handling errors indicate errors attributed to intra-individual factors or processes. Nevertheless, we tested the possibility that TCEs were conflated with individual errors by examining the correlation between the number of bad passes and the number of ball-handling errors in each team. Because TCEs and individual errors represent two different categories of errors in teams (Bell & Kozlowski, 2011), we expect a low correlation between the number of bad passes and the number of ball-handling errors in a team. We gathered data on ball-handling errors in the NBA from 82games.com. Our analysis revealed a very low and non-significant correlation ($r = 0.03$; $p = 0.68$) between the two error categories. We also ran a correlational analysis between average player experience (the mean of team members' individual experience in a team) and individual errors/TCEs. A high correlation was found between average player experience and individual errors ($r = -0.45$; $p < .001$), indicating that individual errors decrease when individual experience increases; but no

[1]According to the official NBA statistics, the average number of turnovers by an NBA team during our period of interest was about 1189 per season, so the deviation is 2.82/1189.

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significant correlation was found between individual experience and TCEs ($r = 0.08$; $p = .19$). To summarize, these results support our argument that bad passes are not conflated with individual errors, and they represent two different types of errors in teams.

The frequency of bad passes is likely to be influenced by the number of offensive plays a team produces, because bad passes can only be committed when a team possesses the ball. Teams differ in their number of offensive plays because they implement different game strategies (e.g., in our sample, the range was between 99.7 and 114.5 offensive plays per game). To ensure comparability, we calculated each team's number of bad passes per 100 ball possessions, using Kubatko, Oliver, Pelton, and Rosenbaum's (2007) formula:

$$PLAYSt = FGAt + TOt + (0.44 \times FTAt)$$

A team's (t) number of plays is calculated by adding a team's field goal attempts (*FGA*), its number of turnovers (*TO*), and its free throw attempts (*FTA*) multiplied by the fraction of free throws that end a possession (0.44; i.e., the opponent team secures possession of the ball). We then divided the total number of bad passes by a team's number of plays and multiplied the result by 100.

Independent and moderator variables

First, *team familiarity* is defined as prior work experience with the same teammates. Following previous studies (e.g., Espinosa et al., 2007; Reagans et al., 2005), we calculated team familiarity by analyzing the number of seasons each pair of players has played together, which resulted in an average number of seasons a player has played together with all the other team members. Then, we multiplied this number by the minutes played by the player in a particular season, to take account of the fact that each player has different amounts of court time (Berman et al., 2002), playing roles of varying importance in a team (Humphrey, Morgeson, & Mannor, 2009). Finally, following previous studies (Huckman et al., 2009; Reagans et al., 2005), we calculated the average team familiarity by aggregating the team familiarity of each player and then dividing the sum by the number of players in the team (an example calculation can be found in the appendix). It might be problematic to aggregate individual-level data to a group-level variable, particularly when there is little within-team homogeneity. However, it is appropriate to aggregate individual-level data in the current study, because the average number of seasons a player has played together with all the other team members is an objective property of each player, not a shared property of the team (Klein & Kozlowski, 2000). To test for the U-shaped relation between team familiarity and TCEs, we squared the team familiarity variable (*team familiarity squared*).

Second, we created a variable that captured team leader prior leadership experience (*team leader prior experience*) before joining a particular team. We treated the NBA coaches as the leaders of their teams. Basketball coaches define a team's game strategy, recruit and develop players, and are held responsible for team performance (Giambatista, 2004; Wright, Smart, & McMahan, 1995), activities that are similar to those of other leaders described in the literature (see, e.g., Hackman & Wageman, 2005a; Morgeson et al., 2010). To calculate team leader prior experience, we summed all the regular season games of a coach in the NBA and subtracted the games coached with his or her current team to avoid overlaps with team leader team-specific experience. We log transformed the variable to account for the possibility that the experience gained from, for example, game 13 to 14 is greater than that from game 240 to 241 (Giambatista, 2004).

Third, we used *team leader tenure* with the current team to measure team leader team-specific leadership experience. Team leader tenure was calculated by summing all the regular season games of a coach with the current team. When coaches left mid-season, we calculated the variable for the coach with whom the team started the season. We also log transformed the variable to take learning curve effects into account (Giambatista, 2004).

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Control variables

We controlled for several factors that can affect TCEs. Our analyses might be biased by endogeneity (Hamilton & Nickerson, 2003); that is, TCEs are not reduced because teams become more familiar but because NBA club management is less reflective (Schippers, Homan, & Van Knippenberg, 2013) and keeps successful teams that commit few TCEs. For this reason, we included a variable that controls for *team performance in the previous season*. Following prior research (Berman et al., 2002; Pfeffer & Davis-Blake, 1986), we measured team performance as a team's win/loss ratio in the previous season.[2] To control for the effect of team members' job-related KSAs on TCEs (Crook, Todd, Combs, Woehr, & Ketchen, 2011), we followed previous studies (e.g., Espinosa et al., 2007; Reagans et al., 2005) and created a variable that measures average *player experience*. Player experience was operationalized as the number of minutes each player has played in the NBA. We added all minutes and divided the sum by the number of players in the team. Because teams that make more passes are more likely to commit bad passes, team's *number of assists* was also included as a control variable. Further, we included the *minutes* played by a team in the regular season as a control variable, because teams play different-length games. For instance, if a game is tied after 48 minutes, both teams play an additional 5 minutes until the game is won, which increases the likelihood of bad passes. A dummy variable was also included to control for the influence of *team leader turnover* during the season because research has suggested that managerial turnovers disrupt team processes (Hill, 2009). The variable was set equal to 1 if a team's coach was replaced during the season (Shamsie & Mannor, 2013). Last, we included season dummies to control for time effects (Certo & Semadeni, 2006).

Analyses

The data comprised repeated observations on 30 teams over a period of nine seasons. Because of the data structure, we used panel regression design (Wooldridge, 2009). We conducted preliminary tests to get a better picture of our data and decide on appropriate panel regression models for data analyses. First, we tested for heteroscedasticity by using modified Wald tests and found the presence of heteroscedasticity ($\chi^2_{(30)} = 201.67$; $p < .001$). Second, the Wooldridge test for autocorrelation revealed problems with first-order autocorrelation ($F_{(1, 29)} = 9.26$; $p = .005$). Third, Pesaran's test (2004) showed the presence of contemporaneous correlation (−2.22; $p = .027$). Autocorrelation is not a major problem for estimator performance, but contemporaneous correlation and heteroscedasticity seriously affect regression estimates (Certo & Semadeni, 2006). Hence, we followed the recommendation of Hoechle (2007) and used fixed-effects regression with the Driscoll and Kraay standard errors (Driscoll & Kraay, 1998), using the *xtscc*, *fe ase* command in Stata 11. Previous research has revealed that the Driscoll and Kraay standard errors reduce the influence of contemporaneous correlation, heteroscedasticity, and autocorrelation in panel data sets (see, e.g., Doskeland & Hvide, 2011). We used fixed-effects models to control for time-constant unobserved team effects (Halaby, 2004) and to calculate within-unit estimates (Certo & Semadeni, 2006).

Results

Table 1 presents the descriptive statistics and correlations among all the variables. The largest correlations were between team familiarity and its squared term ($r = 0.57$; $p < .001$) and average player experience and team performance in the previous season ($r = 0.57$; $p < .001$). The variance inflation factor was calculated for all the variables, and the average

[2]Because making the playoffs could be considered an equally important or more important performance criterion for NBA teams, we conducted all analyses using a dummy variable that was coded 1 if a team participated in the playoffs in the previous season and 0 if otherwise. The results remained unchanged.

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Table 1. Descriptive statistics and correlations[a].

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9
1.	TCEs per 100 plays	6.40	0.74									
2.	Minutes	19 831	72.15	−.04								
3.	Team leader turnover	0.15	0.35	.21***	−.18**							
4.	Team performance previous season	49.89	14.83	−.00	−.16*	−.01						
5.	Assists	1744	144	.22***	−.06	−.07	.31***					
6.	Average player experience	5422	2183	.08	−.10	−.06	.57***	.23***				
7.	Team familiarity	1877	556	−.03	−.09	−.12*	.40***	.26***	.36***			
8.	Team familiarity squared	3 939 358	2 504 903	.12*	.05	−.07	.15*	.17**	.16**	.57***		
9.	Team leader prior experience	3.94	2.97	.10	.03	−.04	.03	.14*	.04	.05	.11	
10.	Team leader tenure	5.30	0.78	−.01	−.21***	−.10	.35***	.30***	.18**	.27***	.15*	−.01

Note: [a]$n = 267$. *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; two-tailed tests.

variance inflation factor was 1.69 with a maximum value of 2.15 (for team familiarity), which is below the cut-off points suggested in the literature (O'Brien, 2007), indicating no problems with multicollinearity.

Prior to running regression models, we standardized all variables to obtain a population mean of 0 and a standard deviation of 1, which improves the interpretation of the relative effects of the variables (Dawson, 2014). Table 2 reports the results of the fixed-effects regression analyses. Model 1 is the base model and includes only the control variables. In Model 2, team member familiarity and its squared term were added to test Hypothesis 1. To test for the hypothesized moderating effects of team leader prior experience and team leader tenure on the U-shaped relation between team familiarity and TCEs, we created linear and quadratic interaction terms composed of team familiarity, its squared term, team leader prior experience, and team leader tenure. Because the interaction terms were highly correlated, we separately tested the interaction effects. Therefore, Model 3 adds team leader tenure, team leader prior experience, and the linear and quadratic interaction terms between team familiarity and team leader prior experience. Model 4 adds the linear and quadratic interaction terms between team familiarity and team leader tenure. We used Models 3 and 4 to test Hypotheses 2a and 2b.

Hypothesis 1 posits a U-shaped relation between team familiarity and TCEs. The linear term of team familiarity in Model 2 is negative and significant ($\beta = -.20$; $p = .021$); the quadratic term is positive and significant ($\beta = .05$; $p = .004$), which supports Hypothesis 1. Following prior studies (e.g., Acharya & Pollock, 2013), we tested the U-shaped relation using Lind and Mehlum's (2010) *utest* command in Stata 11, which assesses whether the relationship is decreasing at low values of the data range and increasing at high values. Analyzing the coefficients in Model 2 revealed that the inflection point lies at a value of about 1.92 ($x = -\beta_2/2\beta_3 = -(-0.196)/(2\ *0.051) \approx 1.92$). This demonstrates that TCEs start to increase when team familiarity is 1.92 standard deviations above the mean value, which is within our data range. Furthermore, the *utest* indicates that both the lower ($t = -4.80$; $p < .001$) and upper ($t = 1.88$; $p = .049$) parts of the curve were significantly different from a monotone relationship, which provides evidence for a U-shape (as opposed to simply a curvilinear) effect.

Cohen, Cohen, West, and Aiken (2003, p. 413) pointed out that U-shaped relations are sometimes caused by outliers. To test this possibility, we re-ran the analysis excluding 13 cases (4.9%) in which team familiarity was two standard

Table 2. Fixed-effects regression results,[a] Driscoll and Kraay standard errors.

	Model 1	Model 2	Model 3	Model 4
Control variables				
Minutes	−0.01 (0.06)	−0.03 (0.07)	−0.05 (0.07)	−0.04 (0.07)
Team leader turnover	0.15** (0.03)	0.14** (0.03)	0.13*** (0.03)	0.14** (0.03)
Team performance previous season	−0.15* (0.05)	−0.12$^+$ (0.05)	−0.08 (0.05)	−0.07 (0.05)
Number of assists	0.06 (0.04)	0.08 (0.04)	0.07 (0.04)	0.07 (0.05)
Average player experience	0.15*** (0.03)	0.19*** (0.02)	0.18*** (0.02)	0.18*** (0.02)
Year dummies included	Yes	Yes	Yes	Yes
Independent variables				
Team familiarity (TF)		−0.20* (0.07)	−0.17* (0.07)	−0.16* (0.07)
Team familiarity squared (TFS)		0.05** (0.01)	0.06* (0.03)	0.05* (0.02)
Team leader prior experience (TLPE)			0.15** (0.03)	0.13* (0.04)
Team leader tenure (TLT)			−0.17* (0.07)	−0.16$^+$ (0.08)
Interaction effects				
TF × TLPE			0.03 (0.06)	
TFS × TLPE			−0.02 (0.04)	
TF × TLT				0.06 (0.04)
TFS × TLT				−0.03* (0.01)
F	25 912.98***	6072.65***	2130.63***	1083.19***
within *R*-squared	0.375	0.395	0.430	0.431

Note: Dependent variable: TCEs per 100 plays. Standardized regression coefficients are shown, with standard errors in parentheses.
[a]$n = 267$. $^+p \leq .10$; $*p \leq .05$; $**p \leq .01$; $***p \leq .001$; two-tailed tests.

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deviations above the mean, as recommended by Cohen *et al*. The results (team familiarity: $\beta = -.16$; $p = .083$; team familiarity squared: $\beta = .13$; $p = .031$) suggest an even more pronounced U-shape (the optimal level of team familiarity lies at a value of about 0.63 standard deviation above the mean), supporting Hypothesis 1.

Hypothesis 2a states that team leader prior leadership experience moderates the U-shaped relation between team familiarity and TCEs such that the U-shape is less pronounced in teams that are led by team leaders with high levels of prior experience. However, neither the linear interaction term ($\beta = .03$; $p = .635$) nor the squared interaction term ($\beta = -.02$; $p = .544$) was significant (in Model 3), indicating that Hypothesis 2a is not supported.

Hypothesis 2b posits that leader team-specific leadership experience moderates the U-shaped relation between team familiarity and TCEs such that the U-shape is less pronounced in teams that are led by team leaders with high levels of team-specific experience. The linear interaction term is non-significant ($\beta = .06$; $p = .140$); however, the squared interaction term in Model 4 is negative and significant ($\beta = -.03$; $p = .036$), supporting Hypothesis 2b.

Following recommendations in the literature (Aiken & West, 1991; Dawson, 2014), we graphed the interaction to better interpret the finding. Figure 1 shows that the U-shaped relation between team familiarity and TCEs is more pronounced for teams with low levels of team leader tenure (one standard deviation below the mean) compared with teams with high levels of team leader tenure (one standard deviation above the mean). The relationship is less pronounced and almost linear for teams whose team leaders have high levels of team-specific experience. The figure further indicates that teams with low levels of team leader tenure commit more TCEs than teams with high levels of team leader tenure; at low levels of team familiarity, the difference between both kinds of teams is about 0.50 standard deviation, which transfers into a difference of 0.37 TCE per 100 possessions. At high levels of team familiarity, the differences are reduced by almost 50 percent to about 0.26 standard deviation, which transfers into a difference of 0.19 TCE per 100 possessions.

It is also interesting to note that there is a significant and positive ($\beta = .15$; $p = .002$) direct effect of team leader prior experience on TCEs in Model 3. This indicates that TCEs increase when team leader prior experience increases. This finding is contrary to our intuitive belief that more experienced team leaders are better able to coordinate team interactions. The result confirms the importance of acknowledging the conceptual and empirical differences between prior leadership experience and team-specific leadership experience (Porter & McLaughlin, 2006).

Additional analyses and robustness checks

We tested the relation between TCEs and team performance to illustrate the importance of TCEs for research on teams. We used each team's win/loss ratio in the regular season as the measure for team performance and regressed TCEs on the variable (note: the model includes all the independent and control variables). We found that TCEs are a significant predictor of team performance ($\beta = -.31$; $p < .001$). This finding remains robust for different

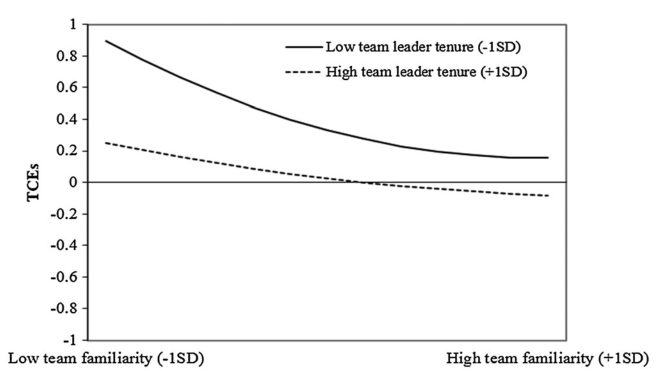

Figure 1. Moderating effect of team leader tenure on the U-shaped relation between team familiarity and TCEs per 100 plays

operationalizations of team performance. For example, when team performance was measured as whether or not teams qualify for the playoffs (0 = *no*; 1 = *yes*), then the odds ratio indicates a negative effect of TCEs (odds ratio = 0.47; $p = .004$). Similarly, when team performance was measured as the team's performance in the playoffs (0 = *did not participate in the playoffs*; 1 = *lost in the first round*; 2 = *lost in the Conference Semifinals*; 3 = *lost in the Conference Finals*; 4 = *advanced to the NBA Finals*), the odds ratio also indicates a negative influence of TCEs (odds ratio = 0.62; $p = .003$).[3]

We also analyzed whether TCEs mediate the relationship between team familiarity and team performance.[4] We tested the mediating effect using the procedure suggested by Krull and MacKinnon (2001) for testing multilevel mediation (note: the use of panel data means our regressions can be regarded as multilevel models in which observations at different points of time (level 1) are nested in teams (level 2)). In the first step, we regressed the control variables, team familiarity, and its squared term on team performance and found that team familiarity is significantly related to team performance ($\beta = .23$; $p < .001$). In the second step, we regressed the control variables, team familiarity, and its squared term on TCEs and found that team familiarity is also significantly related to TCEs ($\beta = -.18$; $p = .011$). Finally, we regressed the control variables, team familiarity, its squared term, and TCEs on team performance. We found a significant relationship between team familiarity and team performance ($\beta = .18$; $p = .003$), and between TCEs and team performance ($\beta = -.25$; $p < .001$). We also analyzed whether the direct and indirect effects were statistically significant by using the *ml_mediation* command in Stata 11 and bootstrapping the command with 500 replications to obtain bootstrapped standard errors. We found that both the indirect effect ($p = .043$) and the direct effect ($p = .001$) were statistically significant. To sum up, the analysis indicates that TCEs partially mediate the relationship between team familiarity and team performance.

Last, we tested the robustness of our findings using different operationalizations of team familiarity. Previous research (Humphrey et al., 2009) has suggested that teams have a "strategic core" of key members. We expect the degree of interdependence between core team members to be higher than that between core and non-core members, and that the former is more predictive of TCEs than the latter. In the NBA, a player's membership of the "core group" is reflected by the minutes he or she plays over the course of a season; the more minutes played, the more important the player is for the team. We define a team's core as the five (or eight) players who play the most minutes over the course of a season. We ran regression analyses using the same variables as in Model 2, but using two alternative measures for team familiarity (one for a core of five players and the other for a core of eight players). Our findings provide further support for Hypothesis 1 (in the model for the top five players, team familiarity: $\beta = -.12$; $p = .027$; team familiarity squared: $\beta = .02$; $p = .051$; *utest*: $t = 1.87$; $p = .049$; in the model for the top eight players: team familiarity: $\beta = -.22$; $p = .001$; team familiarity squared: $\beta = .04$; $p = .002$; *utest*: $t = 2.83$; $p = .011$). Although the U-shape was not as pronounced in these cases as in our original analyses, *utest* results suggest the presence of a U-shape in both cases.

Discussion

Using panel data on NBA teams, we found a U-shaped relation between team member familiarity and TCEs. We also found that team leader team-specific experience has a moderating effect on this relation. Our results revealed that team leader prior leadership experience has a direct positive effect on TCEs but no moderating effect. This unexpected finding suggests that it is wrong to simply assume that prior leadership experience can be easily transferred to the current team or organization (e.g., Mumford, Marks, et al., 2000; Porter & McLaughlin, 2006; Shamir & Howell, 1999). Similarly, earlier studies have found that prior work experience either has no influence (e.g., Groysberg, Lee, & Nanda,

[3]Because the dependent variable is either dummy coded (playoffs yes/no) or ordinal (round in the playoffs qualified for), we had to use logistic regression and ordered logistic regression. Odds ratio > 1 indicate a positive influence; odds ratio < 1 indicate a negative influence.
[4]We are indebted to an anonymous reviewer for suggesting this analysis.

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2008; Huckman & Pisano, 2006) or has a negative influence (Dokko, Wilk, & Rothbard, 2009) on job performance in the current organization. Although the KSAs needed to effectively coordinate teams might be relatively similar across organizations, the results of our study suggest that context specificity still discounts the transferability of team leadership experience acquired in a prior team/organization. This can be explained by the fact that organizations always differ in their routines, resources, and goals (Edmondson, 2003). This is especially true in an NBA-like team. The routines and practices learned in one team might not work well in another team owing to context specificity (e.g., uniqueness of each team member's skill profile and personality, and the idiosyncratic synergy among team members). Therefore, a team leader's ability to manage and coordinate the interdependent actions of team members, via explicit coordination mechanisms, is influenced by team context.

The direct and positive influence of team leader prior leadership experience on TCEs can be explained by leader life cycle theory (Hambrick & Fukutomi, 1991). Over the course of their careers, team leaders tend to commit to the coordination approaches they believe best support their leadership strategy. Thus, an experienced leader who joins a new team might approach team coordination in a way that is incompatible with existing practices, creating coordination problems among team members and TCEs. Sometimes, a team's leader and members have differing assumptions about tasks or do not share the same views, languages, and symbols regarding team coordination. Moreover, a highly experienced team leader who is confident of, and committed to, a certain approach might overlook critical team-focused or task-focused information and ignore the team's unique characteristics and dynamics. This lack of team-specific knowledge serves to diminish the effectiveness of formal and explicit coordination mechanisms introduced by the leader and negatively affect coordination in teams with high and low levels of team familiarity. In a team with a low level of familiarity, the experienced leader finds it difficult to integrate the different perspectives of team members to develop a shared team knowledge model and a common approach to coordination. In a team with a high level of familiarity, the experienced leader is likely to introduce formal coordination mechanisms that conflict with the team's established implicit coordination mechanisms. It is also possible that team members will struggle to align their team knowledge model and coordination approach with those of a new leader, owing to poor mutual understanding. Therefore, prior leadership experience could be a disadvantage for teams, thereby increasing the number of TCEs.

In the following sections, we discuss the theoretical and practical implications of our work. We acknowledge the limitations of the study and suggest directions for future research.

Contributions to research

First, our study contributes to research on errors in organizations. TCEs are a separate category of errors; they deserve research attention because they represent a significant proportion of the errors that occur in teams. We found that TCEs represent 41.8% of all errors in NBA teams, on average. Although we do not have comparable information on TCEs in other team/organizational contexts, previous studies have suggested that coordination errors account for between 15% (Thornton & Zeller, 1991) and 27% (Kern, 1995) of accidents in aviation. Our analysis also revealed that TCEs are related to team performance ($\beta = -.31$, $p < .001$), after controlling for factors such as team familiarity and average player experience. Therefore, this study contributes to the literature on error management in teams and organizations by examining the predictor and moderator variables of TCEs, an important factor affecting team performance. Our findings also support the claim that TCEs result from inter-individual interaction processes. Even if employees have the proper KSAs to correctly perform their singular tasks (as in the context of the NBA), they might still commit collective errors when trying to coordinate interdependencies to achieve a common goal (Bell & Kozlowski, 2011; Hofmann & Frese, 2011).

Second, this study contributes to research on the influence of team familiarity on team performance. The link between team familiarity and team performance is well researched (see, e.g., Espinosa et al., 2007; Huckman et al., 2009; Reagans et al., 2005); however, the direct link between team familiarity and team coordination has rarely been studied, even though previous work has been built on the assumption that team familiarity enhances team performance through

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improved team coordination. The U-shaped relation between team familiarity and TCEs that we found might help explain earlier mixed results regarding the link between team familiarity and team performance. Some studies found a linear and positive relationship (Espinosa et al., 2007; Huckman et al., 2009; Reagans et al., 2005), whereas others showed a U-shaped association (Berman et al., 2002; Katz, 1982). We speculate that more frequent TCEs, which result from too much team familiarity, could explain the U-shaped relationship found between team familiarity and team performance, among other factors. Although team familiarity initially improves team performance by reducing TCEs, too much familiarity impairs team performance by increasing TCEs. Therefore, the point of time at which (or the length of observation time over which) empirical data are collected determines whether the left-hand or right-hand side of, or full U-shape effect, will be observed. For example, we do not expect evidence for the U-shaped relation between team familiarity and team performance from studies using cross-sectional or longitudinal data over short periods or data on *ad hoc* teams. The U-shaped effect between team familiarity and team performance is likely to be observed when researchers collect longitudinal data on relatively stable teams over a long period. This speculation is supported by previous studies. Studies that focused on teams that worked together over a short period reported a linear relationship (e.g., Espinosa et al., 2007; Huckman et al., 2009; Reagans et al., 2005), whereas longitudinal studies (e.g., Berman et al., 2002) and cross-sectional studies that investigate teams that worked together over several years (e.g., Katz, 1982) found evidence for an inverted U-shaped relationship.

Third, our study contributes to the literature on coordination in teams (e.g., Harrison & Rouse, 2014). Research has suggested that familiarity enhances coordination among individuals (Espinosa et al., 2007; Okhuysen, 2001; Okhuysen & Bechky, 2009). The current study shows that team familiarity might actually cause TCEs in the long run, even though it initially improves coordination. This reveals that team familiarity is a double-edged sword: On the one hand, familiarity is important for developing the mutual understanding that helps team members anticipate and adjust to each other's actions, thereby improving coordination. On the other hand, too much familiarity might negatively affect coordination, particularly in dynamic task environments when teams are called upon to handle unpredictable and novel contingencies. Complementary to research suggesting a potential negative effect of employee turnover on coordination (Okhuysen & Bechky, 2009), our study reminds us of the deleterious effect of little turnover.

Moreover, our study is one of the first to empirically analyze the interplay between informal and formal coordination mechanisms by examining the interaction effects of team familiarity and team leader experience on TCEs. Our finding that team leader tenure (team-specific experience) moderates the U-shaped relation between team familiarity and TCEs suggests that formal explicit coordination mechanisms introduced by experienced team leaders help alleviate the negative effect of too much team familiarity on TCEs. For example, team leaders can contribute to successful team coordination by intervening in team processes as soon as they detect improper or detrimental team routines (Gersick & Hackman, 1990). However, our study reveals that successful intervention depends on team leaders having high levels of team-specific experience. This finding suggests that, besides team members' familiarity with each other, team leaders' familiarity with the team is another crucial factor to be included in research on team coordination.

Practical implications

This study has several implications for managerial practices. First, the U-shaped relation between team familiarity and TCEs alerts us to the possibility that the very factor that initially reduces errors might also create errors over time. Managers and team leaders need to avoid the "too-much-of-a-good-thing" effect (Pierce & Aguinis, 2013) when implementing error management systems. Otherwise, interventions or practices trusted to reduce errors might actually increase errors in the long run. Whatever practices or functions they adopt, they should pay close attention to the potential problems that can come with them in the long run and take necessary measures to avoid or eliminate those problems.

Second, the right-hand side of the U-shape between team familiarity and TCEs suggests that managers need to directly intervene in teams in order to facilitate the establishment of team situation models (i.e., team knowledge structures that allow for a dynamic understanding of task situations), particularly in familiar teams working on non-routine tasks.

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Rico and colleagues (2008) have argued that implicit coordination helps teams perform well when tasks are routine. Our study complements this argument by revealing the detrimental effects of too much team familiarity on team coordination in the NBA, an environment characterized by diverse and constantly changing tasks. In these situations, successful team performance requires accurate, situation-specific understanding and responses. Managers and team leaders can support familiar teams by highlighting the idiosyncratic characteristics of a task situation (or a specific performance episode). This will help familiar teams realize the disadvantages of relying on habitual routines and heedless implicit coordination when successful task execution actually requires them to detect and respond to changes in the task environment. Assistance and training can also be offered to help teams develop a proper context-driven task situation model that allows team members to dynamically adjust their coping strategies and actions.

Finally, the findings of this study regarding the role of team leader prior experience and team-specific experience also reveal useful practical applications. An experienced leader joining a new team needs to quickly come to grips with the uniqueness and idiosyncrasy of the team and its members. This kind of team-specific knowledge discourages the team leader from blindly transferring approaches applied in other teams and helps customize coordination strategies and mechanisms. The moderating effect of team leader tenure suggests that leaders with high levels of team-specific experience have acquired the needed KSAs to effectively intervene in counterproductive team processes that negatively affect team coordination.

Limitations and future research

Several limitations of this study deserve attention and discussion. First, a possible limitation is the generalizability of our findings. Although a good number of studies have already used data from sports industries in management and organization research (for a review, see Day, Gordon, & Fink, 2012), there is still the question of whether findings from sports teams can be transferred to non-sport organizational contexts. For instance, TCEs in basketball can be caused by misunderstandings between two players on the same team, by opponents disrupting player interactions, or by both. Opponents rarely have such direct influence on TCEs in non-sport organizations. Nonetheless, studies of extreme events in non-sport contexts (e.g., aircraft accidents) have shown that coordination failures are often due to miscommunication, misunderstandings, or misinterpretations (e.g., Cushing, 1994; Weick, 1990). This suggests that the context in which sports teams operate is comparable with non-sport contexts, to some extent. Given this limitation, we recommend that future research investigate the relation between team familiarity and TCEs in other contexts. We expect that the U-shaped relation between team familiarity and TCEs is to be observed in stable teams with high task interdependence that might be challenged to handle highly dynamic tasks. Stable teams working on routine tasks might not experience the negative effect of too much team familiarity. This speculation is supported by research findings that unfamiliar teams coordinate more effectively than familiar teams when performing highly dynamic tasks, but that familiar teams coordinate better than unfamiliar teams when performing routine tasks (Gorman et al., 2010). We also expect the role of team leader experience to be influenced by team context. For example, it would be interesting to explore how team leaders' involvement in team processes and tasks influences TCEs and the relation between team familiarity and TCEs. Organizations are composed of different types of teams. At one extreme, leaders are tightly integrated into, and work with, their teams (high leader involvement); at the other extreme, leaders work on the sidelines and do not actually perform tasks with their teams (low leader involvement). It is possible that the U-shaped relation between team familiarity and TCEs is less pronounced in teams with less team leader involvement because these team leaders are better able to reflect on and intervene in team routines than highly involved leaders. Our exploratory data analyses revealed a U-shaped relation between team leader team-specific experience and TCEs (team-specific leader experience: $\beta = -.14$; $p = .086$; team-specific leader experience squared: $\beta = .05$; $p = .014$). However, this result does not influence the significance of our findings. We also tested the relation between team leader prior experience and TCEs and did not find any statistically significant associations (team leader prior experience: $\beta = .09$; $p = .214$; team leader prior experience squared: $\beta = -.14$; $p = .452$).

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Future studies are needed to investigate whether these findings generalize to other teams with either higher or lower leader involvement than NBA teams.

A second limitation of our study relates to our measure of TCEs—the number of bad passes a team makes during a season. Using this aggregate measure limits our understanding of TCEs in the following ways. First, we have no insight into whether TCEs are influenced by contextual factors such as team fatigue (e.g., if a team has back-to-back games; see Ashman, Bowman, & Lambrinos, 2010). These contextual factors influence team member concentration and attention and might explain why players make bad passes. However, we were not able to control for these influences because we analyzed the number of bad passes across a whole season. Nevertheless, we argue that these factors are unlikely to systematically influence the accuracy of our TCE indicator because the NBA tries to make team schedules as equitable as possible. Second, we have no information on the specific situation in which a TCE occurred or the individuals who were involved in a TCE. These factors might influence the occurrence of TCEs; for instance, two players who have not played together before will be more likely to commit a TCE than two players who have played many games on the same team. However, we argue that these influences are likely to similarly affect all teams over the course of an 82-game NBA season. Therefore, systematic bias is unlikely. Nonetheless, future research should examine the influence of these factors on TCEs; for instance, by identifying the workers involved in a TCE and establishing their level of familiarity. Third, similar to previous studies on errors (e.g., Buffardi, Fleishman, Morath, & McCarthy, 2000), our measure of TCEs is only a good indicator of errors and confuses to some extent the error itself with its outcome. That is, strictly speaking, bad passes themselves may not be errors, but the factors (e.g., misunderstandings between players) that cause the bad passes are. However, it is difficult to measure pure human error in a non-laboratory empirical context (e.g., Zhao, 2011). We recommend that future studies use laboratory experiments to investigate the intra- or inter-individual processes and mechanisms that explain the occurrence of TCEs. One potentially fruitful perspective is to analyze TCEs from a multilevel perspective. For example, research on individual learning and skill acquisition (e.g., Anderson, 1982) might provide important insights into individual-level processes that are related to TCEs. For example, research might analyze to what extent insights on automatization and habits at the individual level (e.g., Goodman, Wood, & Chen, 2011) contribute to errors at the inter-individual level.

A third limitation relates to our measure of team leader experience. Team-specific leadership experience and team leader prior experience are commonly used measures for capturing team leaders' KSAs (e.g., Giambatista, 2004); however, they neglect important leader characteristics that might influence coordination in teams, such as leadership style. For instance, team leaders with a pragmatic leadership style might be more likely to adapt to new situations and implement new practices and approaches to reduce TCEs than leaders with an ideological leadership style, who may be less open to new routines (Hunter, Cushenbery, Thoroughgood, Johnson, & Ligon, 2011). We could not analyze the influence of leadership style on TCEs owing to a lack of data on the leadership style of all NBA coaches, but we encourage future research to investigate this topic using approaches such as historiometric studies (see, e.g., Hunter et al., 2011).

Finally, although our robustness tests ruled out some alternative explanations for our findings, the observational nature of our data prevents us from drawing definite causal claims for the relation found between team familiarity and TCEs. Future research might test whether the U-shaped association between team familiarity and TCEs can be explained by unobserved factors such as team strategies. For instance, an NBA coach might decide that teamwork should play a greater role in a team's offensive strategy when players have achieved a sufficient level of familiarity. Then, coordination between team members becomes more important as teams rely more heavily on their passing game. Therefore, TCEs will increase as team familiarity increases because more passes suggest higher likelihood for TCEs. We tried to control for this endogenous factor by including a team's number of assists as a control variable in our analysis. However, although every assist is a pass, not every pass is also an assist. Therefore, we cannot completely rule out this alternative explanation.

It is also possible that the U-shaped effect might be caused by physiological factors. Increases in team familiarity are related to player aging, which reduces a player's speed and reaction times (Era et al., 2011). Slower reaction and movement offer more opportunities for opponents to interfere with passes, thereby increasing TCEs. To rule out this alternative explanation, we included player average age as a team-level control variable in our analyses and found

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that age was not related to TCEs ($\beta = .05$; $p = .38$). We encourage researchers to explore the associations between specific physiological factors such as reaction time and speed, team familiarity, and TCEs.

Conclusion

The findings of this study show that we cannot assume a linear association between team familiarity and TCEs all the time in all contexts. We also need to consider the interaction dynamics between formal and informal mechanisms involved in team coordination in order to fully understand the occurrence of TCEs. Our results reveal that team leader prior experience and team-specific experience have different effects on TCEs.

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Appendix. Example Calculation of Team Familiarity

We calculated team familiarity as follows, using the example of the Los Angeles Lakers from the 2002–2003 NBA season: First, we calculated how many seasons each player had played with every other team member. For instance, on average, Kobe Bryant played 5.5 seasons with his other team members, and Samaki Walker played 2.0 seasons with his colleagues. Then we multiplied the average number of seasons played with colleagues by the minutes played in the regular season to get a score for each player's team familiarity.

Example calculation of team familiarity for the Los Angeles Lakers, 2002–2003 NBA season.

Player	Seasons played for the team	Seasons played with the other players	Average	Minutes played in the season	Player's team familiarity
Kobe Bryant	7	(7 + 7 + 6 + 7 + 4 + 2)/6 =	5.5	3401	18 705.50
Shaquille O'Neal	7	(7 + 7 + 6 + 7 + 4 + 2)/6 =	5.5	2535	13 942.50
Derek Fisher	7	(7 + 7 + 6 + 7 + 4 + 2)/6 =	5.5	2829	15 559.50
Rick Fox	6	(6 + 6 + 6 + 6 + 4 + 2)/6 =	5.0	2181	10 905.00
Robert Horry	7	(7 + 7 + 6 + 7 + 4 + 2)/6 =	5.5	2343	12 886.50
Devean George	4	(4 + 4 + 4 + 4 + 4 + 2)/6 =	3.67	1613	5919.71
Samaki Walker	2	(2 + 2 + 2 + 2 + 2 + 2)/6 =	2.0	1243	2486.00

Second, we calculated the team's average team familiarity by summing each player's team familiarity and dividing the sum by the number of players in the team:

$$\text{Team's Average Team Familiarity} = (18\ 705.50 + 13\ 942.50 + 15\ 559.50 + 10\ 905.00 + 12\ 886.50 + 5919.71 + 2486.00)/7 = 11\ 486.39$$