



# Team interdependence and turnover: evidence from the NFL

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## Abstract

**Purpose** – The purpose of this paper is to empirically investigate the interactive effect of turnover and task interdependence on performance in work teams. Based on previous research, the authors contend that turnover will have a negative effect on team performance and this effect will be more pronounced as teams perform highly interdependent tasks.

**Design/methodology/approach** – Using longitudinal data from the National Football League (NFL), the authors empirically examine the effect of player turnover on NFL team performance (i.e. wins and losses in the subsequent year), and the difference in team performance based on the high/low task interdependence of the work team.

**Findings** – Findings suggest a negative impact of turnover on organizational performance, regardless of the interdependent nature of work team tasks. In addition, the negative influence of turnover is enhanced by the task interdependence within a team.

**Originality/value** – This is one of the few studies that examine task interdependence as a moderating variable of the turnover – team performance relationship. More specifically, by examining an industry with high team member turnover (i.e. The NFL), the findings from this study give practicing managers a guide as to which work teams managers should attempt to minimize turnover.

**Keywords** Sport, Turnover, Human resource management, National Football League, Task interdependence, Work teams

**Paper type** Research paper

## Introduction

Teamwork has become more pronounced and used in organizations as a means to accomplish work tasks. Team can be defined as “[...] a group of people working on interrelated tasks to achieve a common goal” (Hsu *et al.*, 2011, p. 2). Cohen and Bailey (1997) define a team as a group of individuals working interdependently within a larger social system (e.g. an organization) with a shared responsibility for mutually pursued outcomes.

For many organizations, team performance is a critical component of the company’s competitive strategy, where team outcomes are the primary determinant of the organization’s success. Often times, the team itself is the foundation of the company’s competitive advantage, providing high value that is difficult for others to imitate.



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In such situations, the teams are operating in an environment where the organization's operations are primarily carried out to support the team and the organization's financial success is heavily dependent on the outcomes of the team. Examples of this type of team would include a musical group on a music label, a legal team in a law firm, or a sport team in a franchise. The current study focuses on one specific setting where team performance is essential to organizational success, the National Football League (NFL).

Given that the performance of work teams is a critically important factor for an organization's success, there is a need to focus on factors contributing to high performance in work teams. Research on teams and groups has looked at a host of variables that contribute to team performance such as size (Guzzo and Dickson, 1996), team member abilities (Kozlowski and Bell, 2003), and team diversity (Cohen and Bailey, 1997). The impact of turnover in teams has also been widely examined. However, we extend the examination of teams by analyzing the interactive effect of turnover and task interdependence on the performance of work teams. Specifically, we investigate how the impact of turnover differs based on settings where team interdependence is either high or low. While researchers have investigated and theorized on the impact turnover has on team processes (and thus performance), we examine the moderating effect of task interdependence on the turnover – performance relationship.

Interdependence focuses on the amount team members are required to interact and coordinate their efforts to effectively achieve the desired outcome (Gully *et al.*, 1995). The greater the need for interaction and coordination to accomplish a task, the greater the level of interdependence (Sundstrom *et al.*, 1990). The greater the level of interdependence, the greater the need for “[...] collective action of team members” (Gully *et al.*, 1995, p. 412). The proper coordination and interaction between team members, such that said coordination and interactions maximize performance, takes time to develop. Furthermore, team member turnover negatively affects team performance (Argote *et al.*, 1995). Thus, we contend that when work teams completing highly interdependent tasks lose team members, their performance will be more significantly impacted than when work teams requiring a lower level of task interdependence experience turnover.

Teams competing in the NFL are one example of these highly interdependent teams. The coordination among team members is critical to overall collective performance. Because turnover is an important part of professional team sports, it is a key element in organizational studies of league and team operations. For example, an examination into general roster turnover in the NFL found only five teams had more than 40 percent of their players remaining on their 2014 roster from the 2011 season (Rosenthal, 2014). High roster turnover is also occurring in other major professional sports (Morse *et al.*, 2008; Spencer, 2013). In the current study we use data from teams in the NFL to test our hypotheses that work teams with high levels of turnover will perform worse than work teams with low levels of turnover and in high-turnover conditions, work teams working on highly interdependent tasks will have lower performance than work teams working on tasks with moderate or low levels of task interdependence.

### **The current study: turnover and interdependence in the NFL**

[...] the different varieties of team sports can serve as a living laboratory for organizational inquiry (Keidell, 1987, p. 608).

By examining the context of the NFL in this study, there is an opportunity to use organizational management and labor practices within the league to study the application of business principles and practices within sport, especially in relation to organizational strategy, human resource management and labor issues (Wolfe *et al.*, 2005; Wright *et al.*, 1995).

*The business of the sports world*

Sport is an unorthodox world that contributes to and is shaped by culture. Over the past 30 years, sport has increasingly been shaped by the spread of consumer culture throughout the world and the resulting acceleration of its commercialization and commodification (Horne, 2006; Rowe, 1996). Sport provides a unique and exciting departure point from which to examine organizational issues (Keidell, 1987; Wolfe *et al.*, 2005). Sport, as a context for business and as a source of entertainment, provides an important platform for investigations into theoretical and applied managerial and organizational issues (e.g. sales force management, team performance, organizational and on-field turnover) (Bouchet *et al.*, 2011; Emery, 2010; Hoye *et al.*, 2008). Coaches, players, managers, and front office/business operations staff are under increasing pressure to perform, leading to a variety of organizational issues (Allen and Chadwick, 2012). As such, this “paradox of commercialism” (Smith and Stewart, 2010, p. 6), led to a need for development of the commercial side of sport to enhance value and profitability while retaining the integral and enjoyable spirit of competition (Rein *et al.*, 2006; Smith and Stewart, 2010).

Thus, over time, sport organizational personnel have been forced to balance the need for sport organizations to make money with the need to uphold the social and cultural values associated with the organizations. Even the athletes themselves were emboldened to seek greater opportunities and compensation (e.g. free agency, guaranteed contracts), while driving ownership and management to seek increasing efficiencies and profits (Szymanski, 2009). The extent to which these forces are in balance or conflict changes from moment to moment, but the idiosyncratic structure of sport as an entertainment-oriented business has and continues to change (Smith and Stewart, 2010; Szymanski, 2009). What is not in question is that the business of sport changed the nature of sport permanently.

This change is unique because it placed sport organization personnel within different leagues in a position to compete against each other to win championships and to cooperate with each other to create and maintain sound business practices (Zimbalist, 2003). Sport teams provide examples of how organizational personnel can be led and managed through the perils of a season to find success in the form of a championship (Weinberg and McDermott, 2002). In addition, sport provides very clear and measureable performance outcomes (e.g. wins/losses, or other very transparent performance statistics).

*The NFL: an analytical focus*

The growth of sport, particularly the NFL, as legitimate for-profit business and the heavy dependence of organizational success on the human resource assets within these organizations provides a great opportunity for analysis (Kahn, 2000; Wolfe *et al.*, 2005). The use of the NFL context is due to its larger, on-field labor force per team (53 players) in comparison to other major professional sports and the high probability of roster turnover due to injury, free agency, and the draft. In addition, past research has emphasized the utility of assessing sports teams as a model for workplace teams

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(Katz, 2001). The NFL is arguably the template for modern sport leagues in America as its business model, although modified over time, is replicated in most sport organizational contexts (Szymanski, 2009).

The NFL model emphasizes cooperation between league franchises despite local monopolies, a decision-making system that emphasizes the collective interests of the franchise and the league, and a closed system that mandates each team's dependence on the others (Grauer, 1983). To encourage parity and harmony, league personnel often become engaged in a struggle over athlete wages within the league as competition for players by teams drives value and salaries upward and impacts the collective nature of the league (e.g. competitive balance, financial stability) (Larsen *et al.*, 2006; Rottenberg, 1956).

Specific to the current study, the level of turnover and the high cost of this turnover both provide a perfect setting for consideration. Given the high cost of player salaries and the intangible costs (e.g. cohesion and trust) associated with replacing team members, this sample gives us well-documented and observable data to assess. In capitalizing on this opportunity, the current study examines the impact of the turnover of athletes and how these actions influence organizational performance.

### *Turnover*

For our discussion, turnover refers to the exiting of a team member from a continually standing work team. Turnover can be conceptualized as an outcome of team composition and interactions or an input to team performance (Van der Vegt *et al.*, 2010). In the latter, the focus is on how turnover has an impact on team processes such as task flexibility, social integration, team learning behaviors, and coordination and communication among team members and how these influence team performance (Van der Vegt *et al.*, 2010). By most accounts, turnover disrupts team processes and, as a result, leads to decreased team performance.

Group member turnover can have dire consequences. Empirical evidence shows that turnover has a negative impact on group performance (Argote *et al.*, 1995). In teams, group level knowledge is developed over time in what has been referred to as a "collective mind" (Weick and Roberts, 1993). Performance is heavily dependent on coordination developed through practice with each other (Berman *et al.*, 2002). Thus, exceptional individual performance does not ensure a positive outcome; it is the combination of high individual level skill and team unity that leads to achieving desired performance outcomes. Groups lacking experience working together will lack the necessary interpretative cognitive schemata needed to ensure a functioning relationship.

Berman *et al.* (2002) describe this team-level knowledge developed over time as group level tacit knowledge. Decision-making accuracy and speed become more of a heuristic skill based on pattern-recognition capabilities and group member knowledge. Further, individual group members provide expertise in unique areas. The overall knowledge/capability needed to perform is inherent in the collective, with no individual having full ownership. As Berman *et al.* (2002, p. 16) describe:

[...] group knowledge is stored in a collective mind, which can be defined as the combination of individual cognitive schemata, patterns, or gestalts acquired through mutual experience and expressed through unconscious synchronicity of action when the group is confronted with complex tasks that must be performed within the context of a challenging environment.

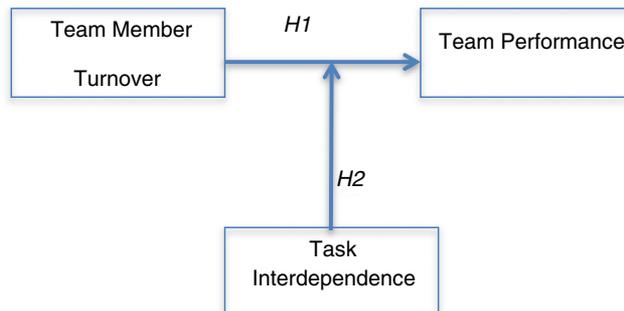
As noted previously, turnover among NFL teams is relatively high (Rosenthal, 2014). Presumably this is because NFL managers are attempting to obtain the greatest talent

available. Because of budgetary constraints, roster limitations, etc., NFL managers are forced to trade players as new talent is brought onto the team. Intuitively, the logic is sound – team composition must change in order to bring new talent (and perhaps better raw talent) onto the team. However, while turnover may be functional at times, research on work teams suggests turnover in any capacity has a negative effect on performance (Foushee *et al.*, 1986). In such environments where heavy dependence on the ability to anticipate teammate behavior and have a clear understanding of task roles exists, the need for sustained team membership over time is essential (Katz, 2001). Thus, team stability can be a more important factor than individual talent in these situations, illustrating the importance of team cohesion (Gammage *et al.*, 2001), collective experience, and the ability to predict team member behavior (Berman *et al.*, 2002). Understanding the roles team cohesion and experience play, we expect turnover in these work teams to have a negative impact on organizational performance. The time needed to develop coordination, trust, and predictability into an actionable heuristic makes turnover instantly constrain the further development of a team.

Teams that are long-standing develop knowledge of the capabilities of other team members and mental schemas of how the team operates with collective effort (Rentsch and Kilmoski, 2001). Several researchers (Berman *et al.*, 2002; Pelled *et al.*, 1999; Harrison *et al.*, 2003; Harris *et al.*, 2012) have noted that long-standing teams have higher levels of performance because, through shared experience, they learn, share knowledge and better coordinate activities. Long-standing teams have more accurate and shared team mental models (Mathieu *et al.*, 2005), which collectively shape the cognitive schema of team members such that their collective effort is directed toward interactively pursuing the team goal. Thus, as previous research has demonstrated, we hypothesize the negative turnover – performance relationship will exist among NFL teams (Figure 1):

*H1.* Turnover will have a negative impact on performance.

While most of the research on the turnover-performance relationship focuses on the mediating role of group processes, we are interested in the moderating effect of the type of task on the turnover-performance relationship. All work teams use a collective pooled effort to reach a common goal; however, the level of interdependence among the team members depends on the type of tasks performed. Certain tasks are deemed to have high task interdependence, such as certain construction projects or basketball teams (Gully *et al.*, 1995). These teams must have high levels of coordination,



**Figure 1.**  
Model of hypotheses

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interaction, and communication among the team members to adequately accomplish their goals. Other tasks, such as production line manufacturing or bowling are low in interdependence among team members. In these situations, while team members are still working toward a common goal there are low levels of task interdependence. As a result, there is minimal, if any, requirement for team members to interact and coordinate with each other to achieve the overall team goals.

As stated in the previous section, when conceptualized as an input to team performance, turnover affects performance by influencing team processes. When turnover in a team occurs, normal team routines are disrupted, norms are changed, new ideas are introduced (van der Vegt *et al.*, 2010) and communication and knowledge utilization is made more difficult. As existing team members are replaced, new team members must learn the capabilities of the existing team members (Berman *et al.*, 2002) and the procedure of pooling collective effort (van der Vegt *et al.*, 2010). It is necessary to develop, test, and refine a new mental schema for the team. Team members leaving and/or joining the team, essentially, is a temporary setback for team coordination, cooperation, and effectiveness.

Interdependence within a group is a key component influencing effective functioning. Thompson (1967) discussed pooled, sequential, and reciprocal interdependence. Pooled interdependence exists when there are multiple parts that function independently and then pool their output to reflect total organization or team performance. Such a situation might be the traditional franchise model of business where each franchise is largely unaware of the actions of other branches and is responsible only for individual branch performance. However, each branch is dependent, in the long run, on the overall success of the larger organization. Sequential interdependence involves one party being dependent on a second party for an input good or some other asset to complete its task. In this case, both parties make contributions and are dependent on success of the whole (i.e. supplier is dependent on buyer success to ensure long-run viability), and the order of interdependence can be specified. Reciprocal interdependence occurs when each independent unit is directly tied to other units for achieving their set objective. Thus, the success of all, even at the task completion level, is dependent on the performance of other actors.

Finally, team interdependence, as presented by Van de Ven *et al.* (1976) exists when all members of a particular group jointly collaborate to diagnose a problem, execute a task, or achieve some alternative objective. This requires a high level of interchange between group members, including information, ideas, knowledge, physical materials, or other exchange. It is this combined set of assets working together via mutual interaction and group discretion that leads to the achievement of an objective (Saavedra *et al.*, 1993). Thus, while traditional team interdependence requires only an exchange of knowledge, information, or assets, teams with higher levels of interdependence require additional team-level attributes that go beyond these more simplistic forms of exchange.

The complexity of some work teams requires team, reciprocal, sequential, and pooled interdependence. Further, their interdependence goes beyond the most complex category described above (i.e. team interdependence), in that it adds the components of trust, cohesiveness, and team member predictability. The NFL team rosters are comprised of a collective group of independent contractors who come together for personal (e.g. contract) and professional (e.g. championship) goals. NFL team personnel employ complicated offensive and defensive schemes. These schemes are contextual and refined every game, but retain a central core of values. While offensive and defensive schemes are complex, they differ in their type and level of interdependence.

Offensive formations involve high levels of task interdependence due to the control issue (i.e. active and audible play calling vs reactive defense) and the complicated nature of personal experience in aligning resources with strategy (i.e. coaching philosophy) (Boronic and Newbert, 1999). Further, offensive execution is heavily dependent on timing (e.g. a quarterback's timing of a pass to a receiver and his ability to predict the exact route taken by that receiver; timing among offensive linemen for execution of a running play, etc.). Quarterbacks often spend months, even years, developing a trusting and cohesive relationship with a receiver to maximize the ability to predict action and enhance performance. This dependence on each individual's execution in collaboration with the mutual execution of tasks that require performance by both parties for success is what distinguishes offensive schemes from defensive.

While still highly complex, defensive schemes are complex in a different way. These schemes require a high level of pooled interdependence where each player knows their own role and must execute this role with extreme precision to ensure there are no breakdowns as a collective unit. Each member of a defensive unit must execute alone, but performance is based on the mutual independent actions of all players. Thus, while both offensive and defensive schemes require a high level of complexity, we distinguish between the two based on the higher level of team interdependence present on offense vs the lower level of team interdependence required on defense.

Given that coordination, cooperation, and proper use of collective effort become more critical to performance as tasks become more interdependent, turnover should have a greater negative effect on team performance when teams are performing highly interdependent tasks than when performing tasks that require lower levels of interdependence. Using our previous examples, turnover of a team member on a bowling team would have a much smaller impact on overall team performance than turnover on a basketball team. On the bowling team, each individual is solely responsible for his or her own performance and it is the combined individual performances that determine overall team outcome. In contrast, adding a new player to a basketball team will require the reestablishment of chemistry between the individuals performing collectively on the courts. Even adding just one new player to the basketball team can have a strong impact on the dynamics of the actual on-court performance:

- H2.* Team interdependence will moderate the relationship between turnover and performance, such that offensive turnover (high interdependence) will have a stronger negative impact on performance than defensive turnover (low interdependence).

## **Methods**

### *Data*

The arena of sport as a population of study provides researchers with numerous benefits not present when studying traditional organizations. Goff and Tollison (1990) address three specific advantages afforded to scholars when using sport as the focus for analysis. One benefit is the access to data for analysis. Given the level of organization in professional and collegiate sport leagues, the consistency and frequency of athletic events provides a continuously growing amount of data for potential analysis. Further, all sport organizations follow a specific set of rules and regulations within their environment, providing fixed parameters that are attractive for researchers. This provides a sort of living laboratory for analysis (Keidell, 1987). Other benefits include the level of data collection present in sport leagues, the precision with which the data is

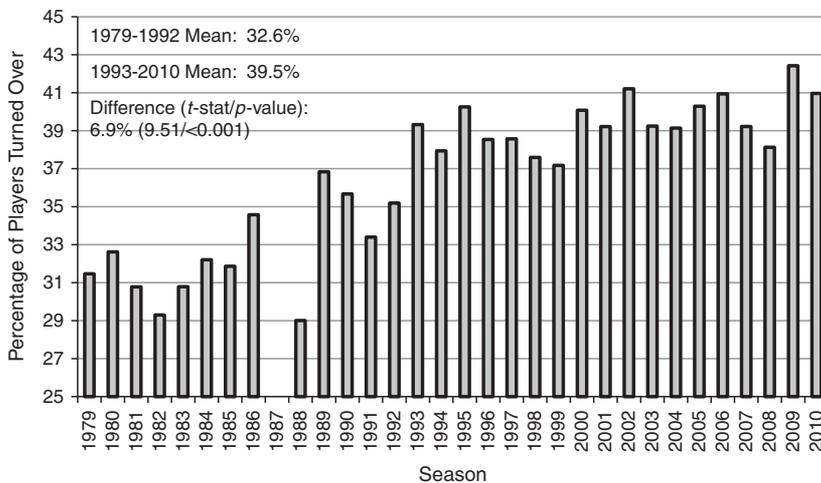
collected and the clarity of outcome variables. As described by Wolfe *et al.* (2005, p. 185), “sport [...] provides opportunities to observe, accurately measure, and compare variables of interest over time and to test hypotheses with highly motivated respondents in quasi-laboratory conditions.”

All data for this study were collected from Pro-Football-Reference.com. Player names, positions and number of games each player started in the season were collected for the 1978-2010 seasons. Team performance was measured by the number of wins a team had in a given season. Game results were collected for all teams across the 1978-2010 time period. Team task interdependence was categorized as a binary categorical variable based on offensive (0) or defensive (1) turnover. Turnover was calculated as the percentage of players on a team’s roster each year that were not on the roster in the prior year. Players were categorized as offensive or defensive based on position.

*Methodology and results*

Figure 2 presents the mean percentage of NFL players that do not return to teams broken down by season. For each team/year the percentage of players that were on the roster in the previous year but are not on the roster in the given year are calculated. Each year, the mean of this percentage is calculated. Turnover percentage follows an upward trend and increases most notably between the 1992 and 1993 seasons. This can be explained by the start of free agency. The mean turnover percentage for the 1979-1992 seasons is 32.6 percent compared to 39.5 percent for the 1993-2010 seasons. The difference of 6.91 percent is significant at the 1 percent level.

Table I presents mean turnover in year *t* and mean winning percentage in years *t* and *t*-1 after dividing the sample into quintiles each year based on turnover percentage. The data are broken into quintiles to provide univariate results that show the direct



**Notes:** This figure presents the mean percentage of NFL players that do not return to the team in the given season. For each team/year the percentage of player that were on the roster the previous year but are not on the roster in the given year are calculated. Each year, the mean of this percentage is calculated. This mean is also calculated over the 1979-1992 seasons and 1993-2010 seasons. The difference of these means is presented with the *t*-statistic for the difference of the means

**Figure 2.**  
Player turnover by season

Turnover quintile	Turnover (%)	Win percentage <sub>t-1</sub>	Win percentage <sub>t</sub>
Low	26.7	61.7%	59.2%
2	32.8	55.7%	54.6%
3	36.8	52.5%	50.3%
4	41.4	46.0%	48.6%
High	50.0	33.6%	37.4%
High-low		-28.1%	-21.8%
<i>t</i> -statistic		(-16.76)	(-11.98)
<i>t</i> -statistic/ <i>p</i> -value		<0.001	<0.001

**Notes:** This table presents mean turnover in year *t* and mean winning percentages in years *t* and *t-1* after dividing the sample into quintiles each year based on turnover percentage. Differences for winning percentages between high and low turnover quintiles (in both year *t* and *t-1*) are presented along with *t*-statistics for these differences. It appears that turnover of a smaller percentage of players is associated with greater success. However, there is clearly a relationship where past success leads to turning over a smaller percentage of players. This does not give a clear picture of how these things are related but it is necessary to present

**Table I.**  
Turnover and team success

effects of turnover on team performance. Average turnover for the highest turnover quintile is 50.0 percent compared to 26.7 percent for teams in the lowest turnover quintile demonstrating quite a bit of disparity of the turnover practices across teams on an annual basis. Differences for winning percentages between high and low turnover quintiles are presented along with *t*-statistics for these differences[2]. Teams in the highest turnover quintile have the lowest average win percentage of any quintile in the year turnover is measured. Win percentage decreases monotonically from the low to high quintile. Teams in the highest turnover quintile have an average win percentage of 37.4 percent compared to 59.2 percent for teams in the lowest turnover quintile. This difference of 21.8 percent is significant at the 1 percent level. Win percentages for years prior to measurement of turnover across turnover quintiles follow the same pattern. It is clear from this result that turnover, as well as past performance, are important factors for future performance.

To control for past performance teams are first divided into terciles based on the prior year's win percentage before further dividing teams into terciles based on turnover percentage (see Table II)[3]. After controlling for past winning percentage,

Turnover % tercile	Low previous year winning % tercile		Middle previous year winning % tercile		High previous year winning % tercile	
	Turnover %	Winning %	Turnover %	Winning %	Turnover %	Winning %
All	42.5	41.9	37.0	50.4	33.2	57.8
Low tercile	34.2	46.8	29.8	56.2	26.3	59.7
Middle tercile	41.5	44.0	36.5	50.5	32.7	59.6
High tercile	51.0	35.5	44.3	44.8	39.9	54.1
High-low		-11.3		-11.4		-5.6
<i>t</i> -statistic		(-4.68)		(-4.60)		(-2.33)
<i>p</i> -value		<0.001		<0.001		0.0198

**Table II.**  
Turnover and future team success controlling for past success

**Notes:** This table presents mean turnover in year *t* and mean winning percentages in years *t* and *t-1* after dividing the sample into terciles each year based on winning percentage in the prior year then further within each of these terciles based on turnover percentage. Differences for winning percentages between high and low turnover terciles are presented along with *t*-statistics for these differences

turnover is still a powerful predictor of team success. Within the lowest tercile for past win percentage, high turnover tercile teams win 35.5 percent of games on average compared to 46.8 percent for teams in the low turnover tercile. Within the middle tercile for past win percentage, high turnover tercile teams win 44.8 percent of games on average compared to 56.2 percent for teams in the low turnover tercile. Within both the low and middle past turnover tercile differences between high and low turnover tercile win percentages are significant at the 1 percent level. Within the highest past win percentage tercile, low turnover tercile teams win 59.7 percent of games compared to 54.1 percent for high turnover tercile teams. This difference is also significant at the 1 percent level but is less than half the difference for the low and middle past win percentage tercile. It is also clear from Tables I and II that successful teams have lower turnover than unsuccessful teams, providing support for *H1*.

Because of the escalated team task interdependence among offensive units in comparison to defensive units, we expect offensive turnover will be more damaging than defensive turnover to team success. To test this assumption, we sorted firms into quintiles separately based on offensive and defensive turnover (see Table III). Teams in the high offensive turnover quintile win 38.1 percent of games compared to 60.4 percent of games won for the low offensive turnover quintile. This difference of 22.4 percent for offensive turnover is much higher than the difference of 12.2 percent for defensive turnover, providing support for *H2* that the negative impact of turnover is more pronounced in situations of high team task interdependence.

Given that NFL teams rely heavily on efficiency and effectiveness of team functioning, if turnover disrupts team dynamics this should be most pronounced early in seasons when players have had little time to develop team unity and cohesion. In Table IV seasons are divided based on games played in the first and second half of seasons and also based on the first, second, third and fourth quarters of seasons. Win percentages are then presented for these periods after dividing teams into quintiles based on turnover. In the first half of seasons, high turnover quintile teams win 35.5 percent of games compared to 61.6 percent for low turnover quintile teams. This difference of 26.1 percent is much higher than the difference of 15.8 percent for the second half of seasons. Differences when dividing seasons into quarters decreases monotonically from 28.6 percent in the first quarter of seasons to 14.1 percent in the last quarter of seasons. This finding provides additional support for *H1* but also

Turnover quintile	Offensive turnover Winning %	Offensive turnover Winning %
Low	0.604	0.556
2	0.511	0.535
3	0.508	0.500
4	0.498	0.478
High	0.381	0.434
Low-high	0.224	0.122
<i>t</i> -statistic	(11.66)	(6.30)
<i>p</i> -value	<0.001	<0.001

**Notes:** This table presents mean winning percentages in year *t* and after dividing the sample into quintiles each year based on offensive and defensive turnover percentage. Differences for winning percentages between high and low turnover quintiles are presented along with *t*-statistics for these differences

**Table III.**  
Offensive and defensive  
turnover and team success

Turnover quintile	First half	Second half	First quarter	Second quarter	Third quarter	Fourth quarter
Low	61.6%	56.3%	63.2%	60.0%	58.3%	54.2%
2	55.5%	54.1%	54.5%	56.6%	53.8%	54.3%
3	48.6%	50.4%	49.4%	47.8%	51.0%	50.8%
4	48.4%	49.1%	48.8%	48.0%	48.2%	50.5%
High	35.5%	40.6%	34.6%	36.4%	39.3%	40.1%
Low-high	26.1%	15.8%	28.6%	23.5%	19.0%	14.1%
<i>t</i> -statistic	(11.73)	(6.16)	(9.76)	(8.21)	(6.23)	(4.51)
<i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

**Note:** This table presents mean winning percentages in year *t* and after dividing the sample into quintiles each year based on turnover percentage. Mean winning percentages are presented after dividing the sample into first and second halves of season into four quarters. Differences for winning percentages between high and low turnover quintiles (in both year *t* and *t*-1) are presented along with *t*-statistics for these differences

**Table IV.**  
Turnover and team success by early and late season

suggests that damage to work team dynamics caused by turnover is partially repaired as new and old team members have more experience working as a group. Thus, this finding is further discussed in the discussion section below.

Table V presents points scored and points allowed after dividing teams based on total turnover, offensive turnover, and defensive turnover. For each turnover measure, points scored are significantly higher (at the 1 percent level) for low turnover quintile teams relative to high turnover quintile teams. Points allowed are significantly lower (at the 1 percent level) for low turnover quintile teams relative to high turnover quintile teams. Both of these findings provide further support for *H2*, demonstrating the benefits of low turnover for offense (i.e. more points scored) and defense (i.e. less points allowed).

Table VI presents a regression analysis where the dependent variable is win percentage and independent variables are total turnover, offensive turnover and defensive turnover, controlling for past year's winning percentage. In agreement with our previously presented results, coefficients of turnover, offensive turnover, and defensive

Turnover quintile	Total turnover		Offensive turnover		Defensive turnover	
	Points scored	Points allowed	Points scored	Points allowed	Points scored	Points allowed
Low	22.9	19.5	23.4	19.7	21.6	19.7
2	21.3	19.9	21.2	20.7	21.4	20.2
3	21.1	21.0	21.0	20.9	20.6	20.3
4	20.1	21.0	19.9	20.4	20.5	21.4
High	18.5	22.5	18.3	22.1	19.7	22.1
Low-high	4.4	-3.0	5.1	-2.4	1.8	-2.4
<i>t</i> -statistic	(9.81)	(-8.01)	(11.95)	(-5.91)	(3.99)	(-6.19)
<i>t</i> -statistic	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

**Notes:** This table presents mean points scored and points allowed in year *t* and after dividing the sample into quintiles each year based on offensive, defensive and total turnover percentage. Differences for points scored between high and low turnover quintiles are presented along with *t*-statistics for these differences

**Table V.**  
Turnover and scoring

	(1)	(2)	(3)	(4)	(5)
Turnover		-0.445 (6.48)			
Offensive turnover			-0.377 (6.70)		-0.345 (5.89)
Defensive turnover				-0.201 (3.70)	-0.109 (1.96)
Last year win %	0.365 (11.57)	0.26 (7.45)	0.267 (7.84)	0.322 (9.61)	0.252 (7.22)
Adjusted $R^2$	0.131	0.169	0.173	0.142	0.174

**Notes:** This table presents regression analysis where the dependent variable is winning percentage and independent variables are past winning percentage, total turnover, offensive turnover and defensive turnover. *t*-statistics are presented under coefficient estimates in parentheses

**Table VI.**  
Regression analysis

turnover are negative and significant at the 1 percent level when included as the only independent variable in the regression specification or when included individually with lagged win percentage. This suggests turnover is damaging to teams, resulting in relatively poor future performance. Further, coefficients and significance levels are lower for defensive turnover than for offensive turnover. This difference is significant at the 5 percent level. When lagged win percentage, offensive turnover, and defensive turnover are included as independent variables, the coefficient of offensive turnover is more than three times the magnitude of defensive turnover. The results when both offensive and defensive turnover are included suggest offensive turnover is more damaging than defensive turnover. Lagged win percentage is positive and significant at the 1 percent level for all specifications.

**Discussion**

Previous research has shown that turnover negatively effects performance (Argote *et al.*, 1995). Further, cohesion and interdependence have been shown to have an impact on team performance (Widmeyer *et al.*, 1985; Gully *et al.*, 1995). This paper examines the impact of turnover on performance for work teams performing highly interdependent tasks vs work teams performing moderately interdependent tasks. Using historical empirical data from the NFL, our findings confirmed that turnover had a negative impact on team performance. Further, we were able to illustrate that teams completing highly interdependent tasks were more negatively affected by turnover than teams completing moderately interdependent tasks. The results of this study have several theoretical and practical implications.

The results presented provide several opportunities for further discussion. First, our findings illustrate the caution that should be taken prior to voluntarily increasing turnover within work teams. While much past research has noted some general benefits of turnover in organizations, turnover within highly interdependent teams appears to require a significant level of delicacy and trepidation prior to making such a move. Of course, consistent with our sample within NFL teams, some turnover is involuntary on the side of the organization (e.g. contract expiration leading to free agency, more attractive offers by competing firms, etc.). However, regardless of recent past performance and confirming *HI*, turnover within our longitudinal sample was found to have a negative impact on organizational performance. These findings confirm other research examining the influence of turnover on work team outcomes

(e.g. Foushee *et al.*, 1986). While assuming generalizability of this finding is not appropriate across all work team settings, it does emphasize the differing influence of turnover in highly interdependent works teams vs that of other forms of teams. These highly integrated, interdependent, and cohesive teams are exceptionally sensitive to changes in their operating setting.

Even more interesting is the importance of team interdependence within work teams relating to turnover implications. Our results provided strong support for *H2*, suggesting turnover of individuals in highly interdependent works teams is more detrimental to firm performance than turnover in settings of moderate or low interdependence. This further confirms the importance of employee retention in work teams, particularly in highly interdependent team settings. Further, our analyses examined the recovery time for work teams experiencing turnover. Ad-hoc analyses suggest that even after a full season, highly interdependent work teams that had experienced turnover were still not able to fully recover back to their previous performance. While this observation does not necessarily mean that all turnover in highly interdependent work teams is bad, it does suggest that this turnover takes a significant amount of time to (hopefully) reach a higher level of performance in the future than the team was achieving prior to the turnover.

There are numerous opportunities for future research in this area of inquiry. For example, what moderating factors can be presented that could mitigate, eliminate, or reverse the effect of turnover in work teams, particularly within the setting of high task interdependence? When considering this from an organizational perspective, issues such as quality of replacement, past experience of the replacement, past experience of the replacement with current team members, or training procedures upon entry could all be potential variables of interest influencing this relationship. The identification of such intervening variables could have important practical implications. Another area for future research is the role of other factors influencing team dynamics in work teams. For example, factors such as team diversity, personality fit, individual confidence, or trust could all be examined in their influence in a work team setting. While we have general knowledge of the impact of such variables in traditional team settings, given the past findings related to work teams we have no reason to assume that the influence of such variables would be identical. A third opportunity for future research would be to examine how voluntary vs involuntary turnover influences teams with high task interdependence.

From a practical standpoint, our findings highlight the need for managers of work teams to properly manage their human capital. In the NFL, the practice of bringing in top talent may not be the short-term answer to increasing the probability of winning. Our findings suggest that when turnover occurs in an NFL team, performance of the NFL team is negatively affected. Thus, if a coach is experiencing a losing season, perhaps the answer to raising performance is through enhanced internal practices and motivation techniques rather than trading current players and acquiring new ones. Such actions could have a negative impact on performance rather than help. Focusing on the team already in place and how the performance of the current team could be increased might be more effective and less costly than the alternative.

To conclude, the present paper used a unique context to assess the implications of work team turnover on organizational performance. Further, we argued that while turnover is disruptive in any capacity in work teams, its impact has a stronger negative influence in situations where there is a high level of task interdependence within the team. Findings provided suggestive evidence for the negative impact

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of turnover, as well as the stronger negative influence of turnover in highly task interdependent teams.

### Notes

1. 1987 is excluded due a strike in the NFL and use of replacement players.
2. Significance statistics for all findings are found at the bottom of each table.
3. Table II used terciles (in comparison to the use of quintiles in other tables) because of sample size constraints. In this table, we break down the data by two variables (turnover and past year's winning percentage). With three categories of each variable, this creates nine groups of teams. The use of quintiles would result in twenty-five groups and would make the groups too small for effective analysis.

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