The Relationship Between Turnover & Team Performance

in Major League Soccer

by

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ABSTRACT

This study examined the relationship between turnover and team performance within teams that played for Major League Soccer. A common widespread belief exists that if team performance is low in team sports, turnover is the solution. Thus, this study attempts to expand upon the turnover and team performance literature, as well as is an attempt to explain additional variance within team performance for teams in Major League Soccer. Using literature on team dynamics, the research team examined the many potentially intervening variables within this relationship. A concomitant time series analysis was then conducted to further investigate this relationship within such a unique context. Results suggest an insignificant relationship of within-season turnover on team performance and team performance on within-season turnover. Further examination is needed to resolve this convoluted relationship and explain incremental variance in team performance for soccer teams.

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CHAPTER I: LITERATURE REVIEW

<u>Introduction</u>

Success within teams can have staggering consequences that vary across the types of teams examined. Take for example success within the business industry. The results of having high team performance can include an increase in profits, employee engagement, and viability within the external environment and industry (Steingut et al., 2017). Typically, organizations within business measure success by examining revenue and profits. The sports industry also measures success with a definitive number; however, this number is not directly financially based. Rather than measuring only the number of profits, sports teams measure their performance with the number of wins over loses, points scored, or other team-based statistics. By doing so, profits indirectly emerge (Steingut et al., 2017). Thus, financial performance is not the only important measure of success within the sports industry.

The indirect financial measurement of success within the sports industry presents unique criteria. That is, because sports teams do not only measure success by financial outcomes, the development and production of team success is different. Therefore, examining these unique criteria (team wins, total points…etc.) will help identify areas of team performance improvement and thus success. For example, by identifying additional variance within performance, practitioners can advise teams on how to structure their goals based upon the areas which will aid their progress towards success. However, there are a multitude of factors that may impede team performance and the process of obtaining success such as turnover.

The concept of team members leaving an organization is seemingly simplistic. However, turnover across industries looks different (Morgan et al., 2004). Whereas turnover can produce positive effects in some organizations and/or industries, it may produce negative consequences in others. Furthermore, the probability of turnover may increase or decrease depending on contextual variables within the environment. For example, the culture of the organization can impact team performance (Foroughi et al., 2018). The culture of the organization is also influenced by an individual's cultural contributions such as national identity, values, assumptions, and artifacts (Ostroff et al., 2003). Foroughi et al. (2018) found that a soccer coach's national identity influences the likelihood of turnover.

Thus, an organization that adopts a culture that encourages change may also support turnover. For example, high-performing work environments create dynamic teams that have been shown to improve performance above and beyond a typical team (Devaraj & Jiang, 2019). Thus, designing and implementing teams which adapt to dynamic environments and produce products and/or services at a high rate can cement positive effects such as increased team performance. Contrastingly, the results of stability of tenure may also support positive outcomes in team performance (Maltarich et al., 2019). Because of the differing predictors and outcomes to those predictors, organizational leaders must examine the values, practices, and team structure they reinforce to help determine why employee/player retention may be an issue.

However, just because organizational leaders implement practices/procedures to control the effects of turnover, the results are not always consistent across situations. That is, certain team tactics may result in positive results for one team and negative effects for

another team. For instance, dynamic teams take time to develop and may have a sleeper effect when showing positive effects after implementation (Devaraj & Jiang, 2019). A sleeper effect refers to a non-immediate treatment effect impacting a dependent variable sometime after the treatment first takes place (Shadish et al., 2002). Thus, some teams may have a sleeper effect; whereas, others may not. This result leaves a convoluted relationship between whether a sleeper effect and turnover increase or decrease team performance.

Not being able to understand the outcomes a sleeper effect endures on team performance may also cause disruption. For instance, if performance is not increased shortly after implementing new practices and/or acquiring or releasing team members, it does not mean that performance will improve eventually. Moreover, sometimes change will initially show a decrease in performance but then start to gradually increase. Another thing to consider is that treatment methods to reduce the negative effects of turnover may not transfer to certain industries regardless of similarity between organizations, settings, and conditions. This is because treatment is typically subject to an environment congruent with the sample tested.

So, what does this mean? This is all to say that what impacts an organization's production outcomes, employee turnover rate, and other important organizational outcomes is determined by many factors that may be difficult to understand and manipulate. For the most part, this is already widely recognized in literature (Morgan et al., 2004). As a result, one may conclude that there are many contextual factors impacting turnover and these may vary across the multitude of industries, organizations, and occupations. Because of this, our study will identify one industry and a specific

occupation within that industry. This study will focus on player turnover in soccer. To better understand player turnover, the researchers will first introduce the impact managerial turnover may have on team success.

Managerial Performance and Turnover

There is a collective uncommunicated belief that when teams are performing poorly it is due to the head coach's coaching ability (Balduck et al., 2010; Madum, 2016). Regarding managerial turnover, one study examined the premier soccer league in Denmark across 19 seasons. Results suggested that managerial dismissal improved subsequent performance for almost all teams who participated in managerial turnover (Madum, 2016). Those that did not have managerial turnover did not have an improvement in performance (Madum, 2016). However, in another study managerial turnover in the midseason has been found to be negatively related to performance (Balduck et al., 2010). An important limitation to both studies represents a lack of generalizability to soccer teams across the world.

An additional study identified support for both studies. Peñas (2011) found that subsequent performance post managerial turnover for soccer teams increased; however, the effects were short term. No long-term effects were reported. Perhaps, regression to the mean contributes to post-turnover performance improvements. That is, poorly performing teams show an overall greater increase in performance than previously high performing teams. Thus, previous performance can be considered as a potential moderator to turnover and future performance. The current study will focus on player performance and turnover in which will add to the literature on the effects of turnover in soccer.

Player Performance and Turnover

Currently, there are many variables that explain variance within performance. Up to this point, there has been a vast number of studies attempting to explain additional variance in hopes of providing practical consultants with means for advising teams. This study aims to extend literature on team performance within sports. One factor that has been in the discussion, but not extensively examined within the sports industry, specifically soccer, is player turnover. There have been several studies that investigated managerial but not player turnover. Seeing as how player turnover is much more common, one would think it also influences performance outcomes.

The researchers will attempt to explain variance within performance for Major League Soccer teams through examining the impact of player turnover. By doing this, the researchers will first define the main variables of interest: team performance and turnover. The researchers will then discuss the variables that impact the relationship between turnover and performance. After which, the researchers will discuss how the main variables of interest affect one another. The researchers will then present the methods, a report of the findings, and a discussion of those findings.

Team performance

Team performance can be defined in many ways. When examining team performance from a conceptual view, several variables emerge as potential contributors to success or failure. Therefore, it is important to consider these possible factors before decision-making within team composition such as player acquisition or dismissal occurs. The consequences of not accounting for factors that impede performance before making decisions such as selection could result in negative outcomes such as loss of morale,

demotivation, decreased performance, and formation of a toxic environment. Player acquisition and viability of meshing individual personalities is an important aspect of cohesion and team performance (Courtright et al., 2017). Because of this, a team manager should have as many of the factors that contribute to a team's success in mind before making a final selection or dismissal decision. To understand the contributors to team performance, one must first define performance.

Each definition of team performance depends on the industry and context in which it is utilized. The operationalization of performance and team composition determines the relationship that exists between them (Bell, 2007). Thus, researchers must be particular about the verbiage and variables included in their analyses. Bell (2007) defines team performance as whether a team can complete its goals and/objectives. Within the sports industry, team performance typically relates to how many wins the team claims. However, depending on the sport, team performance could be measured using team-level variables such as points scored or teamwork outcomes. Team performance can also be measured as the collection of individual behaviors. Moreover, beyond a definition, many variables impact the operationalization and result of team or individual performance.

Individual performance can impact team performance. Aubé & Rousseau (2005) and Porter (2005) found that individual helpful behaviors, or backup behaviors, towards goal commitment and task interdependence lead to an increase in team effectiveness. Team composition, a variable commonly used when defining team variables, is a summation of individual attributes and abilities (Bell et al., 2018). As a result, individual contributions should be considered when examining team performance. Collectively, the

coordination and communication within a team may also influence performance. That is, how a team works together through coordination and communicates while doing so has been found to impact overall team performance.

Bourbousson et al. (2010) examined French national basketball players and found that team coordination during the game was limited to one other teammate. After the study, the players revealed they could only focus on one other player rather than the entire game and their opponents, yet they still understood what types of plays the team were running at the time. Although performance was not investigated, the players examined on this team were the best in their country. Perhaps then this style of team coordination produces stronger positive effects to team performance. Not only does team coordination potentially impact performance, but communication in general may impact performance.

The style of communication established within teams depends on the type of work needed and timeframe to complete it. However, communication style also depends on current performance. Decreased performance has been linked to an increase in strategic communication rather than motivation; whereas increased performance will increase motivational communication and decrease strategic communication (Levine & Choi, 2004). The implications of this study suggest that teams should focus on how to improve their work processes rather than attempting to improve their level of effort when performance is low. However, when performance is high, teams should collaborate on how to maintain their effectiveness.

These findings formulate important implications such as how the communication style implemented within a team changes based on prior performance standings. That is,

since performance and communication are so integrated, one can change manipulatable communication networks to influence or forecast future team performance (Levine & Choi, 2004). Moreover, turnover can also potentially disrupt established communication networks within athletes (Harris et al., 2012). Thus, ensuring team stability and encouraging established team coordination networks can also improve performance. That is, as tenure increases, team performance increases. Communication may also depend on other factors that impact performance such as diversity.

Although it is not directly incorporated in our methods, diversity is relevant because it contributes to an individual's opportunities that include knowledge, skills, abilities, other personal characteristics, and variables that will be directly measured such as performance outcomes. Each of these variables help define team members and separate their unique potential to contribute to team performance. For this reason, diversity will now be discussed.

Diversity in team member attributes has both positive and inverse relationships with performance (Mannix & Neale, 2005; Knippenberg & Schippers 2007). The inverse versus positive findings is contextual to the setting and climate in which the organization exists. That is, positive or negative results of diversity are partially dependent on the circumstances in which diversity occurs. Mannix & Neale (2005) found that diversity can create social divisions which then negatively impact performance. However, Knippenberg & Schippers (2007) discussed both negative and positive outcomes including a curvilinear relationship suggesting that diversity produces positive consequences up to a certain extent. The contrasting findings suggest contextual variables in an organization's setting which moderate and/or mediate the relationship between the

summation of individual attributes equating to team composition and its influences on performance.

Harrison & Klein (2007) distinguish between three forms of diversity: separation, variety, and disparity. Separation refers to differing opinions or in general position among unit members which typically reflect disagreement or opposition; variety infers diversity in disciplinary background such as having a psychologist and an engineer on one team; disparity suggests differences in tenure, experience, and/or status (Harrison & Klein, 2007). Theoretically, scholars have argued that within-unit diversity that has low separation, strong variety, and low disparity encourages positive organizational and team outcomes (Harrison & Klein, 2007). This would imply that turnover would result in high disparity and lead to poor team performance. However, the effects of diversity depend on the team's environment and a multitude of contextual variables. The concept of diversity is convoluted due to the many inconsistent, poorly defined, and generic nomenclature assigned to such a complex topic (Harrison & Klein, 2007). Studies can examine each type of diversity and their impact on team success, but it is likely not able to be generalizable due to many impeding factors such as individual perception of disparity and other forms of diversity. There are forms of diversity that suggest contradicting findings to whether diversity improves or deters performance.

Another facet of disparity to consider is new versus old members. Taking on an optimistic view, diversity in age and experiences benefits team outcomes (Mannix & Neale, 2005). Typically, older employees have more experiences and a unique perspective to give. However, age and other diversity facets may not always promote strong positive outcomes. In addition to age, a study has empirically shown that groups

that had differences in ethnicity among members tended to outperform homogenous groups (Mannix & Neale, 2005); however, the findings showed rather weak effects.

Other studies have shown that diversity within groups regarding educational background diversity may decrease productivity (Nielsen & Nielsen, 2013). Bell et al. (2011) found a rather weak negative effect of educational background variety diversity and team performance (ρ=-.03). Bell et al. (2011) define educational background variety diversity as the distribution of work history across departments within an organization. Educational background variety diversity is important because they are found to be related to task-relevant components (Bell et al. 2011). Finding the negative effects diversity has on team performance may be a result of too much diversity, or differences in experiences, thus leading to a decrease in group member involvement and team performance. This is all to say that there are many forms of diversity, some of which have been shown to lead to positive performance outcomes and some that have shown to produce negative performance outcomes.

Given the many effects diversity has on team performance, one may rationalize that the national diversity among newly signed players or coaches will impact team performance. For example, Foroughi et al. (2018) provided evidence that national diversity impacts managerial turnover, which would then impact performance. Nielsen & Nielsen (2013) found that national diversity is positively related to performance. However, they also explained that literature includes many contradicting findings including negative and inconclusive results. Perhaps this is due to the potential impact subcultures have on an organization's culture.

Subcultures within national culture may also impact the nature of experiences an individual obtains (Ostroff et al., 2003). People are exposed to national values, but also local values of groups they associate more with daily. For example, an individual may be of German nationality, but he/she also participates on a local volleyball team and goes to church on Sunday. His/her values and cultural experiences are changed by those groups. These individual experiences may impact the perceptions toward organization climate and culture and thus intentions on organizational membership. Although it will not be formally investigated, diversity is an important concept to discuss when investigating contributors to team performance. In addition to diversity, individual characteristics have been linked to performance change outcomes.

One study investigated how human capital within sports teams impacted team performance. Harris et al. (2012) found that human capital, the attributes an individual brings to the team, was positively related to team performance. This relationship extended into the coaching staff as well. Thus, the level of attributes and skill that players and coaches brought to the team positively impacted the level of performance obtained. This study expanded the literature on collegiate athlete's efforts towards increasing variance explained in performance. The current study does not measure the impact human capital has on team performance or turnover; however, turnover could potentially change the attributes of team members which then may have a positive or negative effect on team performance.

Additionally, Harris et al. (2012) found that not only human capital, but also relationship stability measured through overlapping tenure impacted unit performance. Human capital is defined as unit level knowledge, skills, and abilities; whereas

overlapping tenure is defined as the amount of time coworkers spent together on the same task (Harris et al., 2012). In this case, overlapping tenure was observed through games played together because the participants were NCAA basketball athletes. Harris et al. (2012) concluded that human capital and overlapping tenure each separately were positively related to team performance. This study contributes immensely to the turnover and performance literature by providing a sports-related sample that contributes evidence to support the idea that increased tenure, and the lack of turnover, produces an increase in team performance. As a result, a rationale can be made for the importance of tenure and shared experience on improving team performance.

Experience comes in the form of organizational and team tenure. Organizational tenure is the overall amount of time a member has worked with the organization (Bell et al., 2011). Team tenure is how long an individual has belonged to a team. Both organizational and team tenure generally have a positive relationship with individual and team performance; however, there is evidence that a curvilinear relationship exists (Bell et al., 2011). That is, too much of a good thing can have negative consequences. For example, there is the potential that employees/players begin to self-loaf and decrease work ethic as their tenure increases. Overlapping, organizational, and team tenure may also contribute to how familiarity improves performance.

The effects of familiarity within teams were examined within coalminers. The authors describe familiarity as the specific knowledge a person has about work aspects including coworkers and the work itself (Goodman & Leyden, 1991). Familiarity with crew members, the setting, and work itself was decreased through absenteeism and eventually, turnover. Goodman & Leyden (1991) found that as crew familiarity

decreased, so did productivity. Thus, increasing familiarity could improve team performance.

As discussed, there are many ways to define and examine team performance. The researchers will be operationalizing team performance as the amount of team wins, losses, and/or ties which result in points earned during a game. Turnover is the other main independent variable examined in this study.

Turnover

Turnover is inevitable and will eventually occur to all teams (Levine & Choi, 2004). Regardless of whether it happens in the beginning, middle, or end of the season, player and/or team member change will occur. Turnover is formally defined as any type of membership change (Levine & Choi, 2004). There are several common reasons why organizations will have turnover. Although many of the factors that influence turnover will not be included within our methods, they will now be discussed due to their potential to impact the variables that are included in our investigation.

Voluntary turnover is when employees willingly choose to leave such as when employees leave to seek a better opportunity; whereas involuntary is when employees are fired or separated from the organization unwillingly. One form of turnover is generational in which older employees are voluntarily or involuntarily replaced with younger employees (Levine & Choi, 2004). Another form of turnover is performance-related and occurs when ineffective members are replaced with new members in hopes of improving productivity (Levine & Choi, 2004). One final example of turnover is involuntary and occurs in sports when players are traded or cut from the team roster because the organization can no longer afford to pay the player's wage. Although seemingly

simplistic, turnover becomes complex due to the many variables predicting and impacting the rate and outcomes of turnover. For example, key player turnover and when turnover occurs can change the outcomes of team performance (Humphrey et al., 2009; Balduck et al., 2010).

Turnover in soccer can include both players and coaches; both of which may have differing outcomes to team performance. Within players, turnover in core roles may produce negative consequences above and beyond that of typical player turnover (Humphrey et al., 2009). For example, if a team tends to lose players such as substitutes or rotates quickly through non-essential players such as a winger, then this may not necessarily impact performance the same as if say a team was consistently losing their key positions such as their captain, or goalkeeper who is positioning the offense and defense throughout the game. Thus, turnover of key players may differentially impact a team's performance. The timing of turnover may also impact the result of turnover.

Turnover does not always occur during the end of a season. Often, turnover occurs within season for various reasons. The result of losing a player or coach mid-season could have dramatic effects that end of the season turnover does not have. Balduck et al. (2010) found that head coach turnover may also impact team performance differently depending on the time in which the coach is let go. The timing of when player turnover occurs has not been investigated and thus provides the researchers with an opportunity to explain the potential for differing outcomes. Specifically, the start, middle, and end of the season turnover presents novel performance consequences (Balduck et al., 2010). Because of this, the researchers examined the immediacy or delayed effect of turnover throughout each season and grouped games in blocks of three. The grouping of

games will be further discussed in the methods section. But first, identifying the antecedents will further explain the rationale for the outcomes of turnover.

Antecedents of Turnover

Antecedents of turnover include the level of team member creativity and conflict resolution ability; as well as the level of autonomy/empowerment and perception of organization commitment (Ziller et al., 1962; O'Neill & Allen, 2014; Liu et al., 2011; Bishop & Scott, 2000). Creativity may be considered as an antecedent, but also a consequence of turnover. Ziller et al. (1962) suggest that open groups encourage creativity. Open groups are defined as those in which turnover is expected and organizational members are considered temporary (Ziller et al., 1962). An increase in creativity may potentially occur because of turnover (Ziller et al., 1962). That is, the ability to have change within composition encourages creativity.

Thus, the ability to have differing viewpoints and perspectives included in team dialogue may encourage people to think differently and creatively. Because creativity may increase as turnover increases, managers may encourage turnover to incorporate an increase in creativity. In addition to examining creativity, Ziller et al. (1962) hypothesized that teams generally believe that an increase in turnover will improve performance if the team currently has a history of poor performance. In essence, low creativity and a history of poor performance would then encourage an increase in team turnover to support an increase in team performance. If this were the case, one may consider low creativity as an antecedent to turnover. However, it is important to note that the results of Ziller et al (1962)'s study was not fully supported. Rather, it was

hypothesized and claimed to be potentially supported if the turnover frequency was greater. Thus, further examination is needed in this area.

In regard to conflict management, O'Neill & Allen (2014) found that the ability to successfully resolve conflict had a significant relationship with team performance and contributed to increased team effectiveness ($r=.30$). As a result, one may propose that an increase in positive team performance outcomes will encourage stability in team composition. This is particularly true if you extrapolate the hypothesis from the previous study mentioned in Ziller et al. (1962). Thus, resolving conflicts may not only encourage an increase in team performance, but a decrease in the likelihood for turnover. The rationale behind this argument can be attributed to the ability to resolve conflicts, but also the inclusion of individual and team-level influencers such as autonomy and commitment.

Furthermore, Liu et al. (2011) incorporates a multi-level approach to define factors that impact turnover potential including both individual and team-level influencers. Results suggested an inverse relationship between both autonomy and psychological empowerment with turnover (Liu et al., 2011). Teams that foster a culture of self-advancement and development in turn encourage positive behaviors and stability in composition. Regarding commitment, Bishop & Scott (2000) presented findings that indicated a positive relationship between satisfaction between coworkers and supervisors and team/organization commitment. Despite the level of team commitment, turnover will eventually occur (Levine & Choi, 2004) So, what happens once turnover occurs?

Consequences of Turnover

Once turnover occurs, what follows is not necessarily consistent across industries (Morgan et al., 2004). That is, turnover can have both positive and negative outcomes. The consequences of turnover can prove to be detrimental to organizations, but also can provide production improvements. Levine & Choi (2004) found that the differing outcomes that turnover provides depend partly on variables that affect turnover. For instance, whether turnover results in a negative, positive, or curvilinear relationship with performance is dependent on task complexity (Levine & Choi, 2004). The more routine the task, the worse the relationship; however, the more dynamic the task, the more positive outcomes that can occur. The examination of both positive and negative consequences of turnover will be further investigated when the relationship between turnover and team performance is discussed.

The impact of turnover on team performance is the focus of this paper. Due to contrasting findings on whether turnover provides positive or negative outcomes to performance, the researchers will take a deeper dive into the factors that contribute to the relationship between turnover and performance. But first, the researchers will define one final variable that contributes to team performance and turnover. A team's composition contributes to many of the variables mentioned above as well as influences the overall performance an organization expels.

Team Composition

Because turnover determines the current roster, team composition is largely influenced by turnover. Team composition is defined as the configuration of team member attributes dependent upon context, operationalization, and time (Bell et al., 2018). Thus, the characteristics of team members may also be a variable that impacts

team performance and the likelihood of turnover. Team composition contributes to various facets of teamwork. These can be described as the ABC's of teamwork; the "A" meaning affective, "B" meaning behavioral, and "C" meaning cognitive. The summation of these components formulates teamwork, by encouraging specific teamwork behaviors depending on the attributes of each team member (Bell, et al., 2018). However, a summation of individual-level variables is not the only contributor to teamwork and group-level variables such as ability, effort, and performance. Process loss and the type of tasks also contribute to teamwork and performance.

Steiner (1972) recognized various types of tasks when examining group performance. These include conjunctive and disjunctive tasks. Conjunctive tasks require all members of a team to result in successful completion; whereas disjunctive tasks require just one member of the team to perform well. (Steiner, 1972; Faddegon et al., 2009). With conjunctive tasks, the team's performance is as good as the performance of its worst member (Faddegon et al., 2009). Disjunctive allows the opportunity for one member to outperform the rest and the aggregate team performance is represented by that one member's high performance (Faddegon et al., 2009).

An example of a conjunctive task within soccer would be the role of a goalkeeper. A goalkeeper has conjunctive task components because if he/she is out of position or performs poorly, then the entire team will be exploited. An example of a disjunctive task within soccer would be some of the other player's performance such as a left-wing forward. If they perform poorly, it does not necessarily destroy team performance, especially if the right-wing forward, or central attacking forward is able to score on their own or improve team performance in some capacity without the help of the poorly-

performing team member. These examples describe how the job task itself can impact team performance. Aside from the type of task, actual productivity depends on several factors including process losses.

Actual productivity is defined as process losses subtracted from the potential productivity (Steiner, 1972). Social loafing and coordination losses are forms of process losses. For example, social loafing could be when the group decreases their production input because each member assumes another member in the group will produce the required work/product. An increase in process loss and other variables such as social loafing then encourages team turnover. Therefore, teamwork and group-level outcomes such as performance include contributions from individual attributes, but also the impact process losses contribute including the type of task performed (Steiner, 1972; Faddegon et al., 2009). Process loss aside, most of teamwork and composition depends partly on the aggregation of member attributes, context in which it lies, a team-level operationalization, and the impeding factors of time. Each of these potential factors will now be further discussed.

Bell et al. (2018) discovered that attributes can be either surface-level such as age, race, or gender; or deep-level such as personalities, attitudes, and values. Whether attributes are deep, or surface-level determines work-related outcomes and influencers. Deep-level characteristics have been found to be more influential to performance than surface-level across time (Bell et al., 2018). Individual attributes may be beneficial to individual tasks; however, performance becomes complex when groups are incorporated. Group performance relies on the aggregation of individual member attributes (Bell et al., 2018, Lo Coco et al., 2019). Because of this, attributes must mix well to establish

effectiveness. Not only will members have to possess the individual task required skills and abilities to accomplish their duties, but they must also possess group work attributes such as teamwork, communication, and collaboration. Additionally, codevelopment of relations impacts the viability of team member attribute effectiveness (Lo Coco et al., 2019). Individual and group-level perceptions contribute to a shared understanding and development of member relations. These relations allow members to thrive individually and as a group.

The context in which tasks are completed also impacts the compatibility of team members and thus variables within composition (Bell et al., 2018). Certain situations increase attribute viability. For example, a composition of soccer players that is in desperate need of leadership may encourage an individual member to display their leadership attributes. Whereas other situations may impede attribute applicability. For example, a situation that encourages strong direction and goal setting will impede groups that possess attributes opposite to that nature such as a free-flowing and non-directive work style.

Operationalization of team roles and expectations encourages a well-defined understanding of team composition (Bell et al., 2018; Bell, 2007). By composing a team in the correct manner, the team feels more competent in their roles to perform their duties. Thus, it is important to consider the context and utilize appropriate measures when selecting team members. A team charter will allow groups to establish this operationalization and inspire concrete guidelines for expectations and goals (Courtright et al., 2017). Team charters consist of team rules and guidelines that members collaborate

on and agree to follow. Typically, these charters also include goals and objectives for the team to work toward.

One final variable that may impact team composition is time. Time can impact variables within composition and teamwork in varying ways. Bell et al. (2014) suggest that composition can be extremely dynamic, or gradual. For example, members could be constantly leaving and joining, or this process could be quite slow by having one new team member added infrequently. This process is typically dependent upon the timeframe in which selection occurs. Sometimes, selection is encouraged more during certain seasons such as the draft in the National Football League. Additionally, time can impact the configuration of attributes such that individual surface-level attributes such as race may not impact composition or teamwork significantly until factors within the context activate it (Bell et al., 2014). However, generally surface-level diversity has less of an impact over time whereas within deep-level diversity, the opposite is true. Bell et al's., (2014) results suggest that time's effect potential varies but can still potentially introduce substantial consequences. From this study, one may conclude that the time-course of changes in team composition variables are dependent on the situation. That is, the manipulative effect one variable has is partially dependent on the context.

Composition is integral to the relationship between turnover and team performance because of its relationship with turnover. That is, turnover affects team composition in several ways including member ability, teamwork, shared cognition, and team coordination/communication (McEwan, 2020; McEwan & Beauchamp, 2014; Argote et al., 2018). Now that team composition has been defined and described by the variables that influence it, a relationship between turnover and team performance may be

discussed. Although seemingly complex, some may think the relationship between turnover and performance is direct; however, there are a multitude of factors that may promote or impede the outcomes associated with the relationship. Not all the following variables will be incorporated in the methods; however, there is significance in discussing them and their potential to impact the variables that are included in this study.

Factors that impact the relationship between turnover and performance

The first of many variables that may impact the relationship between turnover and performance is teamwork. Teamwork is defined as the collective effort of members working collaboratively to complete independent and interdependent tasks in effort towards achieving team success (McEwan, 2020; McEwan & Beauchamp, 2014). Five components are identified: preparation, execution, evaluation, adjustments, and management of team maintenance (MTM). Preparation involves initiating behaviors prior to starting team tasks; execution involves behaviors shown during a team task such as collaboration; evaluation occurs after team task completion and includes some form of feedback towards task completion; adjustments are derived from evaluation and aid future task completion; MTM ensures the social relations between team members are strong and support effective teamwork (McEwan, 2020).

McEwan (2020) indicates that teamwork in the sports industry can be viewed from the perspective of an input-mediator-outcome model of effectiveness. This model suggests that teamwork contributes to emergent states which then affect performance. Inputs are described as the factors within the individual, team, and environment that contribute to relations between members of the team (McEwan, 2020). Mediators are team processes (behaviors and interactions) and emergent states (member cognitive,

motivational, and affective state) (McEwan, 2020). Output is the resulting outcomes of the team inputs and mediators.

An example of input factors within the input-mediator-outcome model includes individual personality components, as well as individual skills, abilities, and experiences (McEwan, 2020). What an employee/player brings to the organization will help determine the team's identity. This is because individual personalities combine to form a team personality (Bradley et al., 2013; O'Neill & Allen, 2014). O'Neill & Allen (2014) found that the summation of positive and negative personality components impacts effectiveness. Thus, teams that incorporate a climate that encourages strong relations and seamless personality blending among team members intuitively support individual effort towards task performance. Not only do team input factors affect performance, but individual input factors including individual personality components such as levels of consciousness and agreeableness also undermine or improve team performance (Bell, 2007). For example, Bell (2007) found that individuals who have high agreeableness and consciousness performed better. However, personality is not the only input factor that influences performance.

Individual ability and experience also impact individual and team performance (Stewart, 2006). In a meta-analysis by Stewart (2006), a moderate effect size was found from a member's level of ability on subsequent performance ($r=.30$). Level of ability breaks down further into task and non-task specific components. For example, positional task knowledge and overall task knowledge were more highly correlated with performance than positional teamwork knowledge and overall teamwork knowledge

(Cooke et al., 2003). These input values produce fluctuating outcomes that influence the mediators within the input-mediator-output model.

Some examples of mediators are interpersonal relations and supportive behaviors. These contribute to an overall perception of teamwork behaviors including cohesion which in turn impacts the level of performance generated (Lo Coco et al., 2019; Aubé & Rousseau, 2005; Filho, Tenenbaum and Yang, 2015; Leo et al., 2019; Spink et al., 2015). A positive relationship exists between strong interpersonal relations and both supportive behaviors and cohesion. Aubé & Rousseau (2005) found that performance increases if goals are set and achieved by team members providing supportive behaviors and working together.

Examples of output from the input-mediator-output model include turnover and performance. What inputs are introduced, and how the mediators impact the relationship will determine what outcomes are produced such as an increase in turnover and thus a decrease or an increase in performance. Essentially, the input-mediator-output model recognizes how contextual variables, including those associated with teamwork, influence one another to determine varying outcomes. In its entirety, teamwork, a subcomponent within team processes, is a complex variable. Literature has suggested that teamwork has influences on the relationship between turnover and team performance; however, teamwork is not the only potential mediating or moderating variable to the relationship between turnover and performance.

Additional mediating variables include collective efficacy and team mental models (TMM). Fisher et al. (2012) describe TMM as sharing similar conceptualizations regarding several aspects of their team context such as task requirements or expected

interactions. Collective efficacy is defined as a group's shared beliefs in its ability to organize and produce a desired goal and depends on a group's cohesion (Leo et al., 2019) A relationship amongst these variables exist in that as TMM and collective efficacy increase, so does team performance (Filho et al., 2015). For instance, if shared cognition and TMM is increased, there is a greater likelihood of behavior being performed more effectively thus allowing for increased performance (Fisher et al., 2012). This is because members understand their role within the team and individually as well as feel confident in their team member's ability. The relationships developed among team members influence team efficacy, shared mental models and total perception of cohesion (Lo Coco et al., 2019; Aubé & Rousseau, 2005; Filho et al., 2015). Thus, the ability to get along and understand one's role in the team will influence both turnover and performance within teams. The ability to improve relationships, team mental models, and collective efficacy, depends partly on the ability to communicate.

Communication networks impact the relationship between membership turnover and performance (Argote et al., 2018; Fisher et al., 2012). Specifically, the number of networks generated, and the clarity of communication transfer is expected to impact, perhaps mediate, the relationship between turnover and performance. As a result, the level of TMM is also dependent on the number of communication networks generated, turnover experienced, and the condition of which the team mental model is in (Argote et al., 2018). For example, Argote et al. (2018) found that a high number of open communication networks within highly connected teams facilitates the development of TMM and other shared cognitions when turnover is limited. However, when turnover is high, an increase in TMM is developed from clear communication rather than just a high

number of networks generated (Argote et al., 2018). Along with communication, collective efficacy may impact turnover. A team's composition is related to collective efficacy due to the perceptions members create based upon their beliefs in their own ability as well as the ability of their teammates to work together (Leo et al., 2019; Filho et al., 2015). As a result, members may choose to leave or join a team based on this collective efficacy and thus performance may change.

The setting or context may also moderate the relationship between turnover and team performance (Bell 2007). The collaboration of individuals is contextual to the environment in which the team works. Cohen & Bailey (1997) found that the most effective way to compose a team is contingent on the organizational setting. Some teams will thrive in a context, whereas other will not. Thus, when examining team performance and composition, researchers should attempt to monitor in a realistic setting. Intuitively, this makes sense; however, little-to-no literature has identified the implications of deviance from lab setting and field studies (Bell, 2007). Perhaps this is due to the experimentally limiting quasi-experimental methods available to industrial-organizational psychologists. Because of this, researchers should expect moderation from the setting of the study. However, this is not a concern of the present study due to the data being collected in a practical setting.

Another potential moderator to the relationship between turnover and team performance is team tenure. That is, tenure may directly moderate the impact of turnover on performance. Marks et al. (2001) define teams as multi-tasking units collaboratively and sequentially working towards goal-directed taskwork. In their study, they present a taxonomy of team processes that divide taskwork into phases. Teams must pass through

each phase to fulfill the required job duties. Naturally, some teams will have gone through this process more than others. Results suggest that as the opportunities to develop viability of team processing increase, so do performance outcome variables (Marks et al., 2001).

Further, Marks et al. (2001) found that teams that have greater tenure will be more effective when dealing with threatening and routine encounters. Therefore, tenure is expected to be a moderating variable to the relationship between turnover and team performance. However, the operationalization of performance may change the outcome achieved due to the varying of tenure and turnover. That is, because of current players being traded for new higher skilled players, individual performance outcomes such as goal or assist statistics may increase, but overall team performance such as wins versus loses may not change or even decrease due to a change in team tenure. Thus, tenure may have differing effects contingent upon the operationalization of performance. Because of this, the methods section will provide an in-depth description of how the researchers will be examining performance. Along with tenure comes compensation.

Salary disparity has been found to impact the relationship between turnover and team performance (Depken & Lureman, 2018; San & Jane, 2008; Sieweke et al., 2016). One study examined the National Hockey League's collective agreement in 2005 and the effect it had on player effort (Depken & Lureman, 2018). The researchers theorized that total team salary was positively related to team performance. Generally, the higher salary cap, or budget capacity for salary expenditures, a team had, compared to other teams, the happier and more willing to perform members on the team were. However, an increase in performance also depends on the internal differences between team member salary.

Results suggest an inverse relationship between salary disparity and team performance (Depken & Lureman, 2018). That is, the further apart a certain player's salary was in comparison to the average member, the worse the total team performance was. Players did not see equity when large pay gaps existed within their team. Further, one study examined a professional baseball team in Taiwan to determine the effects of inter- and intra-team wage disparity has on performance. Like previous findings, an inverse relationship exists between individual wage gaps and individual or total team performance despite the rise in total expenditures (San & Jane, 2008). In other words, the more a team spends on just a few players thus not distributing salary equally resulting in large wage gaps among players, the worse that team performs. These findings indicate that generally, total expenditures and salary disparity have an impact on overall team performance. This can be for many reasons, but one that may be initially recalled is the perception of fairness of pay amongst team members.

Individual perceptions of wage disparity have an inverse relationship with individual performance (Sieweke et al., 2016). The salary disparity may or may not exist; however, even a perception of disparity will negatively impact performance. This study examined players in the National Basketball Association. Sieweke et al. (2016) found that an individual's warped perception of objective internal and external pay standing led to decreased effort and thus performance. If players believed they are inequitably compensated, they decreased their effort in games. The researchers of this current study theorize that this relationship exists for several reasons including motivation, cohesion, efficacy, and perceptions equality losses.

Because an inverse relationship between salary disparity and individual and/or team performance exists (Depken & Lureman, 2018; San & Jane, 2008; Sieweke et al., 2016) one may conclude that the climate generated from this decrease in performance may encourage team members who have unequal compensation to leave thus incurring organizational turnover. Consequently, a negative relationship between salary disparity, team performance and turnover may exist. Aside from the factors that underlie the relationship between turnover and performance, one may wonder how the concepts of turnover and performance themselves impact one another.

How Turnover and Performance impact one another

Most of the literature on turnover suggest a negative relationship with performance (Park & Shaw, 2013; Sturman et al., 2012; Argote et al., 1995). However, this relationship depends on the context in which the turnover takes place (Levine & Choi, 2004; Sturman et al., 2012). For example, Argote and her team of researchers (1995) examined the effects task complexity and turnover have on group performance. They identified a phenomenon referred to as the learning curve. This concept elaborates on a positive relationship between task experience and performance such that as teams build a cohesive setting, they become familiar both with the task and the members of their team. As a result, performance increases. Inversely, groups that experience turnover have a negative relationship with performance (Argote et al., 1995). Additionally, Park & Shaw (2013) conducted a meta-analysis indicating that the results collected suggested a significant negative relationship between turnover and performance, $\rho=-.15$. This relationship was strengthened when voluntary turnover was considered (Park & Shaw, 2013).

As one begins to uncover the consequences of turnover a cyclical process begins to emerge. Not only can turnover impact performance negatively, but other negative consequences are generated. For example, coworkers/teammates may begin to think about leaving the organization as well. Turnover intentions impact the strength of an individual's psychological contract (Mai et al., 2016). As a result, current employees who ponder leaving will begin to engage in more of a transactional orientation rather than relational (Mai et al., 2016). Meaning, individuals are less likely to engage in social interaction to promote personal integration. Because of this, team cohesiveness, transactive memory systems and collective efficacy may also begin to dwindle. (Leo et al., 2019; Filho et al., 2015). One study examined professional soccer teams and reported cognitive deductions resulting from composition changes (Leo et al., 2019). Thus, one may conclude that a shared cognitive awareness or cognition may also be disrupted. Leo et al. (2019) found that teammates lose a shared awareness and are less likely to rely on each other when performing.

Additionally, with turnover, organizational-citizenship behaviors (OCB) start to decrease whereas counterwork productive behaviors (CWB) increase. That is, Motowidlow (2003) suggests turnover increases or decreases the total amount of OCB and increases CWBs. OCBs are volitional behaviors that contribute to contextual performance (Motowidlow, 2003). Typically, an increase in OCBs result in positive performance outcomes. CWBs are behaviors that lead to negative outcomes such as deviant acts or consist of harmful behaviors like theft or physical aggression towards fellow coworkers (Motowidlow, 2003). When turnover occurs, organizations begin to see a decrease in helpful behaviors (OCB) and an increase in harmful behaviors (CWB)

(Motowidlow, 2003). As a result of an increase of CWBs due to an increase in turnover, overall team performance and organizational effectiveness decreases.

Spink et al (2015) explains that a cyclical process is generated and continues by turnover impacting cohesiveness and efficacy, and in turn decreased cohesiveness and efficacy impacting an individual's intentions to leave the organization. Furthermore, athletes that left the team or sport were less likely to return if their perception of cohesiveness was minimal (Spink et al., 2015). These findings are important because they elaborate that cohesiveness can have lasting and permanent effects; thus, turnover also has lasting effects. Moreover, Spink et al (2015) suggested evidence that turnover can disrupt cohesiveness and individual and/or team efficacy. However, negative consequences were not the only findings when researchers examined the relationship between turnover and performance.

Contrastingly, a positive curvilinear relationship between turnover and performance was found in the study done by Maltarich et al. (2019). This study expanded on turnover literature by including unit-level dismissals rather than solely independent, meaning individual dismissal. Maltarich et al. (2019) define unit-level dismissal as turnover initiated by management. Results showed a positive relationship between unit-level dismissals and subsequent team performance (Maltarich et al., 2019). Implications of this study cement a better understanding of the effects of turnover and stimulate managers into firing their poor-performing employees.

Supporting this finding, Park & Shaw (2013) found that a curvilinear relationship existed depending on the context or environment the organization resides. For example, environments that support dynamic transitions are more likely to favor composition

changes than concrete cultures in which resist change. For dynamic cultures, performance

is likely to increase, but only to an extent (Park and Shaw, 2013; Maltarich et al. 2019).

Organizational change has the potential to provide positive consequences; however, an

excess amount will begin to lead to negative outcomes such as stress, negative emotions,

and reduced well-being (Kaltiainen et al., 2019). These results suggest that if

organizations and supervisors effectively manage compositional changes effectively,

positive outcomes can emerge from turnover.

Individual member composition may also impact contribution (Price et al., 2006).

In other words, member ability can impact performance and thus may be supported or

impeded by turnover. Member ability can be perceived as task-relevant knowledge, skills,

and abilities (KSA; Price et al., 2006). Turnover has the potential to increase team KSAs

when a new player is acquired following an inferior player being released, or because

current composition is lacking certain KSAs. On the other hand, when top players are

released, it is expected that team KSAs will decrease. Managers must then consider both

individual and team KSAs when making compositional changes. Along with member

ability, individual emergent states further propagate a convoluted relationship between

performance and turnover.

A positive relationship between performance and turnover suggests an increase in

emergent states and variables associated (Terry et al., 2000; Leo et al, 2019). For

instance, if cohesion increases, then so does the potential for higher vigor and lower

anger, tension, and depression (Terry et al., 2000). In addition, a positive relationship

between turnover and cohesion may exist if prior team performance was poor and/or the

team previously experienced low cohesion and trust. However, higher turnover does not

always increase cohesion (Spink et al., 2015). The outcomes associated with turnover are contextual to the situation. Nonetheless, a positive relationship exists between cohesion, transactive memory systems (TMS), and collective efficacy (Leo et al., 2019; Filho et al., 2015). TMS is described as a shared system of retrieving, coding, and storing information among team members (Leo et al., 2019). It allows members to be aware and knowledgeable of projects/work completed across the organization. In addition, acquiring TMS allows for members to know who is good at what. For example, team members will know whether to pass to another member for a shot and/or who may be best in a specific situation.

Thus, increasing cohesion will increase a multitude of positive cognitive components within individuals and teams. For example, an increase in shared cognition, communication between team members to establish a collaborative awareness, contributes to these positive results (Levine & Choi, 2004). Levine & Choi (2004) found that communication and shared cognition are relevant to motivational outcomes such as cohesion and trust. Diversity among players, such as national or age, may also impact the level of cohesion and cognitive components such as shared cognition within teams (Mannix & Neale, 2005). Additionally, like the lasting potential negative outcomes endured, positive effects have a mirroring impact. The outcomes of turnover vary across situations. Turnover tends to have performance-related consequences, but these effects may be either positive or negative depending on contextual factors such as managerial versus employee retention. The present study will attempt to identify the relationship player turnover has with team performance.

Hypotheses

Hypothesis 1. Player turnover will negatively impact team performance.

The researchers theorize that generally, high player turnover will reduce team effectiveness and overall performance. Thus, a stable player team composition will have a positive relationship with team performance. The researchers theorized this because of the results of losing team variables such as cohesion, shared mental models, and tenure (Lo Coco et al., 2019; Aubé & Rousseau, 2005; Filho et al., 2015). However, this hypothesis may change based on when turnover occurs, and why. For example, if a poorly performing player is removed, performance may improve.

Hypothesis 2. Poor team performance will lead to an increase in turnover.

The researchers theorize that poor performance will eventually lead to compositional changes such as bringing in new players and/or removing poorly performing players. Thus, lead effects may occur in that performance causes a delayed effect on the frequency of turnover.

Research Questions

Research Question 1. Do lag effects mediate the relationship between turnover and team performance?

A lag effect will occur in that as turnover occurs, team performance will not be impacted until several games after the initial turnover occurred resulting in a delayed effect. Thus, will a "sleeper-effect" or lag change team performance or the perception thereof?

Research Question 2. Do lead effects mediate the relationship between turnover and team performance?

A lead effect will occur in that turnover will not occur until several game blocks of poor team performance has occurred. Thus, how long will it take until a turnover will occur based on previous team performance?

CHAPTER II: METHOD

Overview

A collection of archival data was retrieved from the open-source data site (MLSsoccer.com) to examine whether player turnover impacts team performance amongst soccer teams in Major League Soccer. This website has statistics related to individual and team performance data, as well as team composition variables that date back to 1996. The data included were limited to a more recent start date due to the limited number of teams that existed when the league started. Not all teams were created in 1996, thus a list of teams that existed in 2006 was collected. The date 2006 was chosen because the league had at least 10 teams by then which was the number of teams the researchers wanted to include in the study. Then, data were collected on those ten teams starting from 2009. This date was chosen because the research team wanted at least three years of data in existence prior to analysis.

A concomitant time series design was utilized due to the naturally occurring manipulation of our independent variable. That is, player turnover is occurring without the manipulation by the researcher. The concomitant time series approach is a variant of the times series analyses. Aside from the non-manipulation of the independent variable, the concomitant time series is much like the standard time series approach. For example, both the standard and concomitant analyses' major goal is to forecast future occurrences of the dependent variable based on past data (Box & Jenkins, 1970). Much like many other statistical analyses, limiting the mean square deviations between actual and predicted is key to ensuring accurate prediction and analysis of that data. Part of ensuring accuracy is dependent on the data collection and the methodology of one's study.

Data were collected at the game-level for an in-depth analysis of our independent variables' impact on the dependent variables. We then established correlations between turnover and performance data based on three-game blocks. These correlations were established at an individual team level representing a single-subject design followed by replication. Following adjustments to account for temporal patterns in both turnover and team performance, team-level correlations were obtained. In addition, an average correlation among all teams was computed.

Participants

The researchers randomly selected ten teams from those that had been in existence since 2006 to include within the study. These ten teams were then analyzed from the year 2009 and beyond. We chose to start collecting data from 2009 rather than 2006 because we wanted to exclude the potential threats from variables included by teams with less than three years of existence. Once data analysis had begun, the researchers decided to no longer include the first two years of data. The first two years of data were not included because the total number of games per season in Major League Soccer was set at 30 in 2009 which was then increased to 34 games per season in 2011. To accurately compare across years, the same number of data points needed to be consistent. Thus, the data analyzed included nine seasons of data that occurred from 2011-2019. Every player on each team that had available data was included in the analysis at the time we entered the data.

Procedure

Data consisted of turnover and performance data. The performance data consisted of number of points a team received per game. Three points indicating a win, one point

indicating a tie, and zero points indicating a loss. Data were analyzed at the three-game set-level to create a more appropriate measurement scale for team performance. By clustering games into three-game sets, the range of performance scores increased from 0-3 to 0-9 and are more appropriate for concomitant time series analyses. This is because concomitant time series analyses require quantitative data, whereas not all analyses require such data. The concomitant design examines naturally fluctuating data in a non-manipulative research design (Shadish et al., 2002). We decided to cluster games in blocks of three to determine whether turnover data impacted performance in varying parts of the season rather than at the season level. Turnover data were represented by player composition changes; whether a player joined or left the team were each coded as one compositional change.

The compositional and performance data were collected per three-game set for each season. Each team's data resulted in a separate concomitant analysis. Correlations were compared at the individual team-level, by computing a sum for total points and total turnover obtained within three-game blocks. In a separate analysis, correlations were averaged across teams.

Measures

Patterns observed in time-series data often include temporal patterns that obscure the relation between substantive variables. These include autocorrelation and cyclical patterns. Autocorrelation is simply whether previous lags' data, is correlated with data in the current time (Fernandez et al., 2019). That is, autocorrelation answers the question: can we forecast or predict future occurrences based on a trend or cyclical pattern of previous data. It is typical in time-series analysis to remove these temporal patterns and

conduct analysis of the residual variance to allow for a more precise examination of associations between substantive variables. Within this study, a multi-step process was used to analyze the data.

First, the stationarity of the time-series data was evaluated for player turnover and team performance within each team. Stationarity is a common assumption in time series analyses and can be defined as a series without trend, fluctuation, or constant variation (Prins, 2003). This does not mean that the series does not change overtime, rather the way it changes does not fluctuate overtime. Team performance was stationary for all teams, but player turnover was nonstationary for some of the teams. A log transformation was applied to player turnover, for all teams, to stabilize the time-series. Second, linear and quadratic representations of time were added to the time-series models for turnover and performance to control for possible trends in the data. Third, sine and cosine functions were added to the time-series models to control for possible cyclical trends within a season. Fourth, autocorrelation terms were added, as needed, to the time-series models until the residuals became white-noise for player turnover and team performance. White noise can be described as random variation or data that varies randomly around the mean (Fernandez et al., 2019). White noise residuals represent the variable (e.g., performance) after all temporal patterns and autocorrelations have been removed. The white-noise adjustments were done separately for each variable.

Once player turnover and team performance time-series were white-noise processes, it was possible to evaluate the relationship between player turnover and team performance from the teams. The fifth step in the concomitant time-series analyses was to estimate the cross-correlations between player turnover and team performance. For each

team, lagged values of player turnover, synchronous values of player turnover, and lead values of player turnover were correlated with team performance. Finally, the cross-correlations for each team were averaged to obtain an estimate of the relationship between player turnover and team performance for the league as a whole. The researchers used SAS Studio 3.8 to analyze the data.

Player Turnover

Turnover included within season turnover per game. The researchers operationalized within-season turnover by attributing turnover as when a player leaves the team and/or as a player joins the team. Changes in the starting roster, the players indicated to start each game, were not considered as turnover because these changes are quite frequent and do not constitute changes to the team composition. Moreover, there are many reasons for changing the team member playing time outside of increasing performance such as resting a key player for an upcoming big game.

Player turnover data were then collected on the total amount of players that left or were dismissed from a team. Additionally, players joining the team were counted as turnover. The number of player turnovers was calculated for each team within each game. Then, the total number of player turnovers was calculated for each team across each three-game set. As previously mentioned, we grouped three games into one block. Thus, turnover was calculated at the game level and aggregated to three-game sets for each team to provide analysis at the three-game-set level. Finally, lagged and lead values of turnover at the three-game-set level were created to use in the concomitant time series analyses.

Team Performance

Team performance was measured by gathering points per game. The point system in Major league Soccer is determined by the number of wins, losses, and ties a team has. So, a win was three points, a tie was one point, and a loss was zero points. As with turnover, team performance was calculated at the game level and aggregated to three-game sets for each team to provide analysis at the three-game-set level. Games played beyond the regular season were not included because not every team was given the opportunity to play additional games and thus including them would make the total games uneven amongst teams.

The researchers used a time-series design utilizing data across several seasons to investigate the relationship between player turnover and team performance within the season. The researchers chose to examine team performance within a time series design because the concomitant time series design provides unique results such as the comparison across games and establishment of a large data source as well as other benefits within longitudinal designs. The longitudinal design provides an examination of data over an extended period and thus establishes a trend of data. Each team included in the study had its own cross-correlations for player turnover and team performance estimated which allowed individual examination into the natural-occurring relationship between turnover and performance. The correlation between lagged player turnover and team performance represents the impact that player turnover has on future team performance. The correlation between lead player turnover and team performance represents the impact that team performance has on future player turnover. Consequently, the impact of player turnover on team performance and the impact of team performance on player turnover were investigated through ten unique teams over nine years.

CHAPTER III: RESULTS

Descriptives

The descriptive statistics were reported on a team-basis averaged for each year of data. The kurtosis values for both performance and turnover were above the recommended value to be considered a normal distribution (+-1). Additionally, the skew values for all the turnover values were above the normal limits; however, the performance skew values were all within acceptable limits. The means and standard deviations for the original variables are presented below. A log transformation was required for player turnover to make the time-series stationary. Thus, the time-series analyses and cross-correlations involving team performance were based on log (player turnover).

Table 1

Averaged Mean & S.D. of Performance and Turnover for all Teams

Team	Points Mean	Points S.D.	Turnover Mean	Turnover S.D.
1	1.24	1.29	1.50	0.78
2	1.27	1.30	1.54	0.97
3	1.42	1.31	1.30	0.63
4	1.31	1.30	1.33	0.61
5	1.47	1.31	1.32	0.66
6	1.45	1.31	1.32	0.65
7	1.45	1.31	1.30	0.60
8	1.41	1.30	1.29	0.62
9	1.37	1.29	1.36	0.69
10	1.25	1.26	1.38	0.72

Note. Analyzed at per-game rather than 3-game set.

Due to the inherent nature of random variation within our model, a reduction process was implemented to uncover possible linear or quadratic trends. The extraneous effects of time series analyses are not components within the forecasted series; however,

are still sources of variation (Fernandez et al., 2019). As previously mentioned, autocorrelation is whether previous lags are correlated with data in the current time (Fernandez et al., 2019). White noise can be described as random variation or data that varies randomly around the mean (Fernandez et al., 2019).

The time-series model used to obtain white-noise residuals for player turnover is summarized in Table 2. Time trend data indicated no linear or quadratic relationships among any teams for player turnover. That is, as time progressed, there was no pattern of an increase or decrease in turnover that coincided with time alone. Regarding cyclical trends, both sine and cosine were used as a control. Aside from team eight, every sine function was significant or approached significance. Cosine had one significant and two marginally significant effects of log changes in turnover. A cyclical trend is a series of patterns that is repetitive but does not follow a linear trend (Fernandez et al., 2019). A total of six teams were identified as having white noise. For the remaining three teams, five significant autocorrelations were observed for turnover. Meaning, patterns within the data existed for turnover. Two teams, team eight and team five, had two significant autocorrelations within their turnover data. Adjustments for autocorrelations resulted in white noise for all teams. As previously mentioned, white noise is random variance, absent of autocorrelation, based on a moving average typically seen within time series analyses (Rohan, 2013).

Table 2

Time-Series Models Needed to Obtain White-Noise Residuals for Player Turnover

	Team ID									
	1	2	3	4	5	6	7	8	9	10
Stationary Process?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Trend										
Linear	N	N	N	N	N	N	N	N	N	N
Quadratic	N	N	N	N	N	N	N	N	N	N
Cyclical										
Sine within Season	Y	Y	Y	Y	Y	P=.06	Y	N	Y	Y
Cosine within Season	N	N	N	N	Y	N	N	N	P = .08	P=.10
Autocorrelations										
White-Noise without autocorrelations	Y	Y	Y			Y			Y	Y
Lag5				Y						
Lag7					Y					
Lag2							Y			
Lag4								Y		
Lag11								Y		
Note. N = nonsignificant, Y = significant based on an alpha of .05.										

The time-series model used to obtain white-noise residuals for team performance is summarized in Table 3. Time trend data indicated no significant effects for linear or quadratic trends aside from one marginally significant linear effect. Meaning, as time went on, there was not a general trend of an increase or decrease in total points based on time alone. Whereas the sine function was significant for nearly all teams in turnover, the opposite was true for team performance. Only one team, team nine, had a significant sine function. However, cosine was like turnover in that only one team had a significant finding. After adjusting for cyclical trends, the performance of four teams were identified as having white noise. Regarding autocorrelations, six significant autocorrelations were observed. Adjustments were made to remove these autocorrelations to achieve white noise. After white noise was established for both turnover and team performance, cross-

correlations were computed to examine relationships between turnover and team

performance.

Table 3

Time-Series Models Needed to Obtain White-Noise Residuals for Team Performance

	Team ID									
	1	2	3	4	5	6	7	8	9	10
Stationary Process?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Trend										
Linear	N	N	N	N	N	N	P=.08	N	N	N
Quadratic	N	N	N	N	N	N	N	N	N	N
Cyclical										
Sine within Season	N	N	N	N	N	N	N	N	Y	N
Cosine within Season	N	N	Y	N	N	N	N	N	N	N
Autocorrelations										
White-Noise without autocorrelations			Y	Y			Y		Y	
Lag15	Y									
Lag1		Y								
Lag10					Y					
Lag6						Y				
Lag2								Y		
Lag14										Y
Note. N = nonsignificant, Y = significant based on an alpha of .05.										

Substantive Findings

      Cross-correlations can represent synchronous, lagged, or lead effects. Lagged

correlations represent the impact of turnover on team performance after a certain number

of three-game sets. Thus, each lag represents a three-game set. The cross-correlations

between player turnover and team performance (coded as total points) are shown in Table

4. There were four lags identified as having significant values. Team two had a

significant negative relationship during lag 5 with a value of $r=-.222$, suggesting that as

turnover increases, total points decreases. Team five had a significant positive

relationship during lag 8 with a value of $r=.225$, suggesting that as turnover increases, so

does total points. Team nine had two negative significant correlations one during lag 1 with a value of r=-.204 and another at lag 8 with a value of r=-.213. Three of the four observations for which turnover was related to performance changes, turnover was associated with lower team performance at a later date. The timing of the performance changes varied across these teams. It is important to note that the negative relationship between player turnover and team performance was observed for two teams and a positive relationship was observed for one team. For the other seven teams, player turnover did not seem to affect team performance. That is, there was no relationship between turnover and later performance for seven of the ten teams.

There were also a few significant lead effects (see Table 4). Lead is the relationship between current team performance and future team turnover. For example, a lead 2 means that team performance impacts turnover 2 three-game sets later. Lead effects are meaningful to understand because the impact of team performance on turnover may be delayed rather than occurring immediately. Team five had a negative lead correlation for lead 2 with a value of r=-.25 meaning that poor team performance led to increased turnover two game sets later. Team six had two negative lead correlations with values of r=-.24 for lead 1, and r=-.27 for lead 4. Team nine had a positive lead 4 correlation with a value of r=.24 meaning that high team performance led to a trend toward turnover four game sets after the initial team performance. In total, four significant lead results were identified, three of which had a negative relationship indicating that poor performance may tend to prompt roster changes. Those four significant findings were within three teams thus leaving seven teams that did not show

significant leads. That is, most teams did not show a relationship between performance and later within-season turnover.

A total of four teams were identified as having either significant lag or lead effects. Specifically, team two had a significant lag 5; team five had a significant lag 8 and lead 2; team six had a significant lead 1 and lead 4; and team nine had a significant lag 1, lag 8, and lead 4 effect. Of the total seven significant correlations between total points and turnover, two were positive relationships. A potential pattern was observed between lag and lead effects in that leads have a shorter latency than lags. That is, decisions to make roster changes following poor team performance may occur more quickly than the effects of roster changes on team performance.

Table 4

Cross-Correlations of Total Points with Player Turnover

	Team ID									
	1	2	3	4	5	6	7	8	9	10
Total Points Unrelated to Turnover	Y		Y	Y			Y	Y		Y
Lag5 Turnover		-.222								
Lag8 Turnover					.225				-.213	
Lag1 Turnover									-.204	
Feedback Loop if Leads Significant										
Lead2 Turnover					-.252					
Lead1 Turnover						-.240				
Lead4 Turnover						-.270			.238	

One team in particular, team five, showed interesting results. Team five had both significant lead and lag results. A significant cross-correlation with a value of $r=.23$ was reported in lag 8 meaning that turnover occurred, and performance improved 8 three-game sets later. Lead 2 had a significant negative correlation with a value of $r=-.25$ indicating that poor performance led to turnover 2 three-game sets later. These findings

are interesting because both positive and negative findings existed in the relationship between team performance and turnover. For instance, lag was a positive correlation whereas lead was negative. The below table presents team five's lag and lead data. The column "Turnover Lag" represents the correlation turnover has on performance regarding lag effects. The "Turnover Lead" column represents lead effects, or the relationship team performance has with future turnover.

Table 5

Cross-Correlation Coefficients for Team 5

Turnover Lag	*r*	Turnover Lead	*r*
Lag 0	.00	Lead 1	.10
Lag 1	.06	Lead 2	-.25*
Lag 2	.06	Lead 4	.15
Lag 3	-.18		
Lag 4	.06		
Lag 5	.01		
Lag 6	.10		
Lag 7	-.17		
Lag 8	.23*		
Lag 9	-.12		
Lag 10	-.02		
Lag 11	-.06		

Note. * indicates $p<.05$.

Once individual teams were examined, the researchers decided to average the cross-correlations. This was done to investigate an overall relationship between turnover and team performance (total points). Included in Table 6 are the lag and lead effects. As mentioned previously, lag represents team performance following turnover and a certain number of three-game sets later, whereas lead is the relationship between team performance and future turnover. Based on the averaged output, no significant

correlations for lag or lead were found. Below is a table of the averaged cross-

correlations for all teams included in the study.

Table 6

Average Cross-Correlation Coefficients for Team
Performance & Turnover of all Teams

Turnover	r	Turnover	r
Lag 0	-.01	Lead 1	-.04
Lag 1	.03	Lead 2	-.02
Lag 2	.01	Lead 4	-.06
Lag 3	-.06		
Lag 4	-.01		
Lag 5	-.03		
Lag 6	.03		
Lag 7	-.01		
Lag 8	-.01		
Lag 9	.05		
Lag 10	.03		
Lag 11	.02		

CHAPTER IV: DISCUSSION

Time series analyses are often used as a tracking device for business metrics and are at the heart of forecasting economic inputs/outputs and sales and providing yield or workload projections (Prins, 2003). Essentially, time series are used to better understand the underlying relationships between substantive variables despite the existence of underling linear, quadratic, and/or cyclical trends in the data. A concomitant time series analysis was used to examine the relationship between within-season turnover and team performance in soccer players in Major League Soccer. The literature on turnover presents both positive and negative relationships between turnover and team performance (Levine & Choi, 2004). Regarding the negatives, Harris et al., (2012) found a positive relationship between tenure (lack of turnover) and team performance in National Collegiate Athletic Association (NCAA) basketball teams. This study used regression as their primary form of analysis. Bell et al., (2011) conducted a meta-analysis and found a general finding of a positive relationship with tenure and performance, but in a curvilinear fashion. That is, higher team stability and organizational tenure (low turnover) results in team performance up to a certain extent. However, eventually, turnover needs to occur due to social-loafing and decreased work ethic (Bell et al., 2011). Thus, positive relationships between turnover and team performance also exist. Maltarich et al. (2019) and Park & Shaw (2013) found that turnover increases performance especially within dynamic environments. Utilizing turnover, organizations can get rid of poor performing team members or those who simply do not fit well.

Thus, a mixed number of findings are present in the turnover and team performance literature. Part of this is because the antecedents to turnover are contextual

and context specific (Levine & Choi, 2004; Sturman et al., 2012). For example, Argote et al. (1995) found that task complexity impacts whether turnover positively effects team performance. That is, as task complexity increased, turnover began negatively impacting team performance. This study examined groups that experienced turnover and groups that did not. Differing levels of task complexity were introduced. Groups that did not experience turnover were able to outperform those that did when task complexity increased. In addition to task complexity, there were several team-level variables that contributed to the convoluted relationship between turnover and team performance such as team mental models (TMM) and shared cognition.

For instance, Argote et al. (2018) found that because of an increase in TMM and other shared cognitions, team performance increased. The implications of Argote et al. (2018) contribute to a better understanding of shared cognition and turnover decisions by increasing the amount of knowledge that decision makers can use when making personnel decisions. In other words, by better understanding the contributions of group variables such as TMM and/or shared cognition on performance, management personnel of sports teams may have an increased comprehension of the impact of turnover on performance and can make better decisions when hiring and firing. Furthermore, organizations can better understand how much and what parts of communication are important to help increase performance given each team's turnover rates.

A separate study examined the differing levels of player performance and subsequent turnover using hierarchical linear modeling of baseball teams. The researchers found that team performance may improve if there is turnover of poorly performing players; however, it may decrease if the turnover is of a key player perhaps

due to an injury (Humphrey et al., 2009). As a result, the relationship between turnover and team performance may be moderated by the value a player contributes. Along with this potential moderation, there were many factors that contributed to the effect turnover had on team performance in lag effects. This study examined these lag effects of player turnover on team performance, as well as the effect team performance had on player turnover (lead effects).

At the individual team-level, this study's cross-correlations for lag data reported several significant findings. Within these findings, there were both short-term and long-term effects of turnover. That is, the one positive effect of turnover on team performance was observed in several game sets following turnover whereas some negative effects were observed relatively quickly while others were observed several game sets later. For example, team five had a significant positive lag 8 finding meaning that a small positive relationship existed with turnover and total points. This result suggests that as turnover increased, so did total points. However, this effect was observed 8 three-game sets later. Thus, researchers and consultants should be cautious when attributing this turnover change with performance since the performance change occurred 24 games later. This is because several potentially moderating variables may have contributed to the positive change in performance during this time span. For instance, Levine & Moreland (1994) proposed a model that suggests it takes time for a new member to be fully assimilated into the group. Therefore, the addition and/or removal of members may not impact performance until several game sets later as suggested by the results of the present study.

Team five was the only team that had a positive lag correlation between total points and turnover. In other words, turnover led to increased team performance. In

general, most of the significant lag results observed were negative. For instance, team nine reported a significant negative relationship with lag 1 and lag 8 between turnover and total points and team two had a significant negative lag 5 correlation. A negative relationship suggests that as turnover increases, total points decrease. That is, turnover negatively impacts total points.

Literature on lead effects in time series analyses, especially in sports data, is sparse. The present study examined lead effects and thus expanded the literature. In addition to the few significant lag effects, there were also several significant lead effects. A significant lead means that team performance is believed to impact player turnover in a delayed effect following a certain number of game sets. For example, if a team had a lead 1, then it meant that poor performance occurred led to turnover within three games later. Team five had a significant lead 2 which was a negative correlation suggesting that poor team performance led to turnover about six games, or 2 three-game sets, later. Team six had a significant lead 1 and 4 with both being negative correlations suggesting poor performance had short and long-term effects by producing turnover for 1 and 4 game sets later. Team nine had a significant lead 4 which was a positive correlation suggesting that high team performance led to increased turnover 4 game sets later. It is difficult to attribute within-season turnover to team performance because of performance when the turnover occurs several game-sets later. Moreover, seven of the ten teams examined did not report significant lead effects. Thus, the findings of lead data should be more thoroughly investigated.

In addition to the individual data, the researchers decided to average the cross-correlation findings to determine if any significant averaged correlations were observed.

When investigating the averaged lag data, no significant relationships were found at the $p<.05$ level. Additionally, no significant lead correlations were found. However, there was a balance between negative and positive correlations among the weak averaged lag variables. Lead had all weak negative relationships between team performance and future player turnover. Overall, it does not appear that turnover consistently impacts team performance or that team performance consistently impacts in-season player turnover.

The individual and averaged findings provide practical implications for Major League soccer teams. The first implication is that the current study does not present consistent patterns of turnover-impacted team performance, nor team performance-impacted turnover. This inconsistent relationship begs a more in-depth investigation of the relationship. For instance, examining the differing effects on performance among the players involved in turnover. That is, examining how turnover of high versus low performing players impact team performance. In addition, the difference effects within the type of turnover i.e. player losses and acquisitions. Finally, the difference among injury-related and non-injury related turnover. Despite not finding patterns between turnover and team performance, practitioners can find value in these findings.

There is value in not finding a consistent pattern of significant lead and lag correlations. An additional implication resides in the observation that if this study were reviewed by practitioners and team managers, they may discover that turnover generally does not impact team performance in a consistent pattern. Also, turnover does not improve team performance short or long-term in a consistent manner. Thus, when managers make selection and turnover decisions, they can be reassured that player turnover generally does not negatively nor positively impact team performance. Also,

when team performance is low, this does not always mean that within-season turnover will lead to improved team performance. Rather, turnover and selection decisions should be made by a team-by-team basis.

One difference exists between the current study, the previously cited studies, and others within the literature. The difference is that the previous studies primarily examined the relationship between turnover and team performance using a form of regression whereas the current study used a concomitant time-series approach. The few studies that do use time series do not investigate this relationship directly. Even more difficult to find, a concomitant time-series analysis investigating the relationship between turnover and team performance. One final notable difference is that although these studies examined the effects of turnover, they did not examine the timing of the effects. Another relatively unique feature is that lead effects were investigated in this study. The current study expands the literature by examining these relationships within the sports industry, specifically Major League Soccer, using a concomitant time series approach, and by examining how timing impacts these relationships. Despite these new additions, there were several limitations of the study thus influencing the need for further investigation.

First, comparing points of all teams may not necessarily be an ideal predictor of improved team performance on its own because of the many factors involved within team performance (Lo Coco et al., 2019; Aubé & Rousseau, 2005; Filho et al., 2015). For example, skill of players, coaching ability, and whether players are in-form could all impact which team scores the most points. Despite these concerns, points still seem to be the best criterion available.

Second, further examination into the relationship between turnover and team performance should investigate the difference between turnover of key/core players and typical players in within Major League Soccer. Humphrey et al (2009) and Badluck et al. (2010) found differences in turnover among key/core teammates; however, this research did not extend to soccer players. Differentiating the results within each individual team should also be further investigated because each individual team could generate specific recommendations for when turnover is needed. For example, if it was determined that turnover positively impacts team performance, so long as prior performance was low for a certain number of games, then coaches would know when to make compositional changes. However, discovering such a finding may be diluted by the many moderating variables within the relationship between turnover and team performance.

For instance, a non-linear relationship may exist between turnover and team performance such that an addition of a high performing player may increase team performance, but the addition of multiple highly performing players may decrease team performance. Perhaps this may be due to the disruption of coordination and/or shared mental models. As previously mentioned, a decrease in team mental models and coordination will result in a decrease in performance (Argote et al., 2018). Thus, investigation is needed to further discover the multitude of relationships that exist between turnover and team performance.

Third, the study solely examined within-season turnover. Effects of between season turnover may be different. That is, off-season turnover is typically more frequent than within season and thus may also contribute to this relationship. Thus, more research is needed to investigate both within and between-season turnover in hopes of

understanding the similarities and differences amongst the types of turnover and how they contribute to the relationship.

One final recommendation is to investigate the relationship between managerial turnover and team performance. Specifically, head coach turnover; however, research could extend into further management staff such as the assistant coach. As mentioned previously, a collective belief exists in that poor team performance is due to the head coach's performance (Balduck et al., 2010; Madum, 2016). Thus, it is recommended to examine other factors involved within the relationship between turnover and team performance such as key/core player turnover, in-depth investigation of individual compositional patterns, and managerial turnover.

CHAPTER V: CONCLUSION

Understanding the components that influence team performance has been researched for many years in attempt to anticipate and predict future performance. A compounding explanation of variance continues to develop and thus the ability to find incremental change in performance variance becomes more complex. As described, there are many factors that explain performance variance, or moreover, contribute to the relationship between composition, turnover, and team performance. The researchers proposed that one variable that adds to incremental team performance variance of soccer teams is player turnover. That is, team performance may be improved by modifying the occurrence or frequency of turnover. Additionally, turnover may be influenced by the level of team performance. However, the present study's results do not provide consistent nor compelling results to suggest such relationships.

Although somewhat heavily researched in a business setting, turnover in sports has yet to be fully understood regarding the consequences to performance. Currently, contrasting literature over positive or negative impacts from player and coach turnover provokes further examination of this area. The results of this study suggest few small to moderate cross-correlations suggesting a somewhat inconsistent relationship between turnover and total points. The significant findings that were found were rare and not strong correlations. Thus, the researchers are not confident in making the claim that turnover helps predict team performance, nor does team performance predict turnover. Further investigation within player turnover, including examining managerial turnover, is needed to help explain additional variance within team performance for soccer teams in Major League Soccer.

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