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Abstract

Both sports and organizations rely on teams. As such, the sport psychology and management literatures have contributed greatly to our understanding of team functioning. Despite this, previous reviews based on subsets of articles in these literatures indicate a lack of communication between them. In this article, we assess the state of integration between the entirety of the sport psychology and management literatures on teams by considering the full set of interconnected team articles in the SCOPUS database (6,974 articles over 69 years). We use this data to conduct a combination of citation network analysis and content analysis via topic modeling to evaluate conceptual integration. The data show that interdisciplinary discussion between these two fields is lacking, particularly regarding the integration of sport psychology into management research. Whereas 7% of references to team articles in sport psychology come from management journals, only 0.6% of team references in management journals come from sport psychology. Despite this, longitudinal analysis indicates that in the last 10 years the rate of integration between these fields is increasing. We identify specific topics that have accounted for this integration and suggest topics ripe for future integration.

Keywords: Interdisciplinarity; Team Science; Citation Network Analysis; Topic Modeling; Sport Psychology; Management

Accepted Manuscript
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Team science aims to understand the complex processes underlying how bounded, structured entities that emerge from the purposive, interdependent actions of unique individuals effectively execute tasks (Arrow, McGrath, & Berdahl, 2000). Because of their structural reliance on teams, the disciplines of sport psychology and management have greatly contributed to this effort, exploring questions such as how to design teams, how team member interaction results in collective performance, and how to lead and motivate team members (Wolfe, Weick, Usher, et al., 2005). As Eys and colleagues identify (Eys, Bruner, & Martin, 2019), "there are two broad reasons to advocate for a research focus on the dynamics of small groups in sport and exercise contexts" (p.41). First, groups are omnipresent in physical activities, even those that involve individual competition such as track and field. Second, relational and collective processes within sports fundamentally alter the experience of physical activity (Eys et al., 2019). Similarly, Mathieu and colleagues (2019) note "in short, teams have become the basic building blocks of present day organizational designs" (p.18) since they provide organizations with ways to maximize their human capital and the adaptability to align members' skill with task demands. Yet, scholars have long-observed a lack of communication between sport psychology and management while consistently calling for their further integration (Day, Gordon, & Fink, 2012; Gentry, Hoffman, & Lyons, 2017; Wolfe, Weick, Usher, et al., 2005). This is especially important since integration may help both fields gain a better understanding of team dynamics, given independently identified shortcomings and calls for necessary future work (Eys & Spink, 2016; Eys et al., 2019; Mathieu, Gallagher, Domingo, & Klock, 2019).

Still, evidence for this lack of communication has been based on quantitative analyses of subsets of articles (e.g., Doherty, 1998) or selective qualitative reviews of the literature (e.g., Day et al., 2012; Fletcher & Wagstaff, 2009; Wolfe et al., 2005). While experts clearly have an

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

idea of trends within their area of expertise, and may even follow multidisciplinary trends despite barriers that often prevent such broad pursuance (Fiore, 2008; Kaplan, Milde, & Cowan, 2017), without a comprehensive analysis it is difficult to tell the degree to which these important domains of team study actually communicate or what they communicate about.

In this article, we report the results of such a global analysis. We examine topic and reference patterns between the full set of 6,974 connected teams articles in the SCOPUS database published in scientific journals from 1951 through 2019. In doing so, we assess the state of communication between the sport psychology and organizational team literatures, discuss the structure and content of their state of communication, and suggest paths forward. Our scope also differentiates us from previous quantitative work using citation networks to provide in-depth examinations of particular theories or phenomena within sport psychology (e.g., Bruner, Erickson, Wilson, & Côté, 2010; Gustafsson, 2014). Instead, our aim is to examine the overarching ontology and relationship between these fields. Hence, our research is the first comprehensive attempt to answer four questions: First, to what extent is team research from sport psychology and management integrated? Second, how has this integration changed over time? Third, what specific topics have driven this integration? And fourth, what topics represent promising opportunities for future integration?

Our first question is motivated by the importance of integrating sport and organizational team research into a broader understanding of team functioning. Although these two literatures are based in different contexts, they both focus on how emergent processes and states affect team dynamics and outcomes, moving toward the development of more applicable multilevel theories of teamwork (Carron, Martin, & Loughead, 2012; Crawford & LePine, 2013; Kozlowski & Klein, 2000). Sport psychology also has the ability to inform broader theoretical questions that

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

have lingered in the organizational study of teams, for example consistent calls for valid longitudinal models of team dynamics (Cronin, Weingart, & Todorova, 2011; Waller, Okhuysen, & Saghafian, 2016). Our second question concerns assessing these trends over time. This assessment allows us to observe whether communication between these fields has responded to the consistent calls to integrate (Day, Gordon, & Fink, 2012; Gentry, Hoffman, & Lyons, 2017; Wolfe, Weick, Usher, et al., 2005) and whether these fields have increasingly or decreasingly recognized each other's work.

While addressing these first two questions allows us to assess the amount of integration between these fields and patterns of change in their integration over time, it does not differentiate between topics studied in each field that may differ in their relative degree of integration. This is the focus of our third question. In answering it, we assess the major topics discussed within the sport psychology and management team literatures and the major topics discussed between them. This allows us to identify topic areas which are mature in one community compared to the other, and thus address our fourth question concerning which topics represent advantageous opportunities for future integration, an important step in providing a path forward.

To address these questions, we first discuss our research design and methodology. Then, we report the results of our analyses. Finally, we discuss the importance of integrating findings from sport psychology and management into a broader team science, and make forward-looking suggestions concerning closing the gap between these literatures.

Method

We implement a mixed method approach to evaluate the extent of integration between the sport psychology and management team literatures overall and across time, as well as the content that has either enabled integration or poses opportunities for future integration. First,

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

citation network analysis provides a systematic approach to evaluate the extent of integration between communities of scholars by examining the interconnections between articles through their references (Moore, Shiell, Hawe, & Haines, 2005). Past research has used citation network analysis to assess the interconnectedness of articles related to team building in sport (Bruner, Eys, Beauchamp, & Côté, 2013), athlete development models (Bruner et al., 2010), sport burnout (Gustafsson et al., 2014), and mentoring across disciplines (Lefebvre, Bloom, & Loughead, 2020). Rather than interconnection within a subset of sport psychology, we evaluate interconnection at the field level. This increases the number of articles considered requiring use of the computational methods described below.

In citation network analysis, a reference in an article forms a directional knowledge link flowing from the cited article to the citing paper. Identifying the set of academic articles dedicated to the phenomenon of team science (nodes) and the related knowledge links via references between them (edges) provides the foundation of the "team" literature citation network. Going beyond examining general levels of interconnectedness within the citation network, we classify the article nodes into scholarly communities based on SCImago JR classification (i.e. sport psychology, management, general psychology, other). We evaluate the relative counts of reference edges that cross the communities in each direction.

Citation network analysis assesses the extent of interconnection between communities, but provides no insight into what concepts are being discussed or transferred. We use content analysis as a second method to delve deeper into the knowledge concepts that developed within and flow between sport psychology and management. More specifically, we use a computational method called probabilistic topic modeling (Blei, 2012; Hannigan et al., 2019) across all abstracts for each of the connected articles in the citation network. Abstracts focus on main

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

concepts and results in a given article (Blei, Ng, & Jordan, 2003). Topic models are overarching latent themes represented by groups of words that commonly appear together within a document and in many documents across a large corpus of otherwise unstructured documents (Blei, 2012). In this case, the documents are article abstracts. The topics emerge from the set of abstracts through a statistical machine learning algorithm called Scikit-Learn: Machine Learning in Python (Hoffman, Blei, Wang, & Paisley, 2013) that represents each document in the corpus as some distribution of the emergent set of topics (topic-to-document matrix), i.e. each abstract is some combination of overarching latent concepts (Blei, 2012).

Topic models are the overarching themes for all the documents in the corpus, so we combine the citation network analysis with the topic model analysis to demonstrate which topics are predominantly studied in each scholarly community, which topics are referenced across communities, and which topics are more isolated. The topic-to-document distribution matrix from the topic model algorithm links those themes to specific articles which are coded into scholarly communities and may be cited by the other community. This combination of methods illuminates the extent of interaction, links the topics that have been integrated across communities, and offers future opportunity for such integration.

Specification of Article Population

We compiled articles based on a query of the SCOPUS database, which broadly indexes articles, abstracts, and citations across many domains. Our search criteria limited the articles to the following: (i) document type “articles” which (ii) included “team” in the article title, abstract, or keywords, and (iii) were exclusively limited to the general SCOPUS categories of “business, management, and accounting (all)” and “psychology (all)”. The result returned 13,111 articles as of February 25, 2020 (beginning in 1917), for which we also extracted the 645,416 references.

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Each unique article (and reference) has a unique SCOPUS_ID. With the focus on interconnection and to limit the potential of spurious usage of the term "team", we narrowed the pool of articles to only those that reference or were referenced by another article in the original set of 13,111 articles leaving 6,974 connected articles with 31,325 edges or directional dyads. Of the 6,974 connected articles, 6,887 had abstracts available, which we extracted as well.

Procedure

Citation Network Analysis

To create the citation network we started with the 6,974 connected article nodes and made a list of unique, directional dyads based on each reference in each article yielding 31,325 edges. Given our intent of examining the interrelationship between sport psychology and management, we coded journals into four categories: sport, management, psychology, and other. Articles were subsequently coded into those four communities based on the classification of the journal they were published in. To code the journals, we used the journal title as well as the journal category classification for each journal from SCImago JR (https://www.scimagojr.com/, SJR), a publicly available journal ranking portal based on data from the SCOPUS database. The SJR classifies each journal into domain categories. We started with "Sport" then "Psychology" then "Management" then "Other" such that once a journal was coded it would not be coded again. Of the 6,974 connected articles, 824 were "Sport" (e.g., *Psychology of Sport and Exercise*, *Journal of Sport and Exercise Psychology*, *International Review of Sport and Exercise Psychology*), 1,867 were "Psych" (e.g., *Journal of Applied Psychology*, *Annual Review of Psychology*, *Personality and Social Psychology Review*), 4,177 were "Management" (e.g., *Academy of Management Journal*, *Organizational Behavior and Human Decision Processes*,

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Research in Organizational Behavior), and 19 were "Other" (e.g., *Systems Research*, *Chronicle of Higher Education*, *Museum Management and Curatorship*)[1].

To visualize the team citation network, we used the Python library iGraph to create a graph data structure from the 31,325 team article-team reference edge dyads. We apply the OpenOrd algorithm (Martin, Brown, & Wylie, 2007), an open source algorithm for plotting large network data sets and chose to apply a distributed recursive layout approach for the plot layout. This approach trades off between minimizing the distance between related nodes and minimizing the density of the points by iterative clustering to optimize the display of the citation network. The resulting visual allows the reader to see clusters of articles that represent sub-communities of integrated scholarship. In Figure 1, sport psychology article nodes are colored red while management article nodes are colored blue, general psychology nodes are yellow, and "other" nodes are black to better visualize the extent of integration and linkages between the two fields.

Beyond visualization, we are also interested in the count and direction of knowledge flows between communities. For each of the 31,325 team article to reference edges, we coded the article and the reference into the four categories mentioned above yielding dyads of directional flow of knowledge from the reference category to the citing article category. For example, an edge where a sport psychology article cites a management article would be coded as "Management into Sport" since the knowledge is flowing from the "Management" reference into the "Sport" article. We did this for all edges then counted each directional combination between the four community classifications by year for the trends and overall for the general level of interaction.

[1] We also conducted an alternate coding where we first coded "Sport" then "Management" then "Psychology" then "Other". This switched the coding of 13 journals, four of which were prominent: *Organizational Psychology Review*, *Personnel Psychology*, *Industrial and Organizational Psychology*, and *Journal of Occupational and Organizational Psychology*. This did not affect our findings as these journals only accounted for 120 edges.

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Building on this analysis, we conducted two more in-depth analyses to demonstrate the status of integration between these two fields. First, to examine citation trends over time, we analyzed the three-year rolling average of the cross-referencing of management in sport psychology journals, of sport psychology in management journals, of general psychology in sport psychology journals, and of sport psychology in general psychology journals (Norder, Emich, & Sawhney, 2018). Finally, we further investigate cross-referencing between these two fields by qualitatively focusing on the articles in a given community that received the most citations from team articles in another community.

Content Analysis via Topic Modeling

We also generated topic models that represent the 6,887 abstracts available for the connected team articles. Topics provide the latent concepts prevalent in the set of articles and we use all the connected articles to capture the topics that span all communities. The text of the abstracts was tokenized or split into single word components (unigrams, e.g., "efficacy") and two word combinations (bigrams, e.g., "collective efficacy"). The list of less meaningful terms called "stop words" from the Natural Language Training Kit (NLTK) such as "is" and "the" were removed (Hannigan et al., 2019: 592). Frequencies per document of the remaining unigrams and bigrams were counted and processed into topic models with the open-source *Scikit-learn* python software package, particularly the Latent Dirichlet Allocation (LDA) module (Hoffman, Blei, Wang, & Paisley, 2013). The LDA form of probabilistic topic modeling is the most established form and has been used in several recent prominent psychology and management publications (e.g., Antons, Joshi, & Salge, 2019).

The topic modeling algorithm requires input parameters including the number of terms (unigrams or bigrams) per topic and the total number of topics. We were interested in greater

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

conceptual homogeneity with sufficient descriptive terms to represent the latent concept so we chose four terms per topic. Also, we wanted to capture a wide range of latent concepts so we ran the four term topic models from 100 to 200 topics in increments of five and then chose the number of topics based on the combination of lowest perplexity score, a measure of mathematical fit and semantic interpretability of the topics (Blei, Ng, & Jordan, 2003). The result was 160 four-term topics that represented the latent concepts across all 6,887 abstracts. Of the 160 topics, we could link 106 to various team contextual factors, structural features, compositional features, and mediating mechanisms (Mathieu, et al., 2019). For example, the set "leadership, leader, transformational, transformational leader" was coded as transformational leadership, the set "efficacy, collective, style, collective efficacy" was coded as collective efficacy, and the set "model, shared, mental, mental model" was coded as shared mental models. Differences in descriptive naming were reconciled for 106 topics while the other 54 represented generic research terms that could not be directly classified into a specific theme, e.g., one topic with terms "research", "paper", "study", "management", or the combinations were not clearly applicable to a single concept, e.g., "capacity", "performance", "study", "individual".

Integrating Topic Modeling with Network Citation Analysis

Topic models demonstrate the overarching latent concepts being discussed across all articles as a whole and network citation analysis shows knowledge flow among team science communities. To understand the extent of conceptual integration across communities requires evaluating which concepts are discussed in each community and which are referenced across communities. Doing this requires combining these two methods to highlight patterns of cross-community content integration. The topic-to-document distribution matrix provides the relative representation of each topic in each document (i.e. the sum of weights across topics for a single

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

document is equal to one). To see what each community is studying, we calculated relative emphasis on each topic by the sum of the weights for a given topic across all the articles in a given community divided by the number of articles in that community. Then, we compared these relative average weights across communities. To see which content is being referenced across communities, we repeated our calculation of this relative average weight by topic, but only for the articles in a community that were referenced by a specific other community. For example, we averaged the weights by topic for all management articles referenced by sport psychology articles to see which concepts are being drawn from management into sport psychology. We repeated this for each direction between communities.

Results

Interconnectedness via Cross-Referencing

We visually mapped the citation network of these communities as a first step toward addressing the extent to which the sport psychology and management literatures on teams are integrated. The network plot in Figure 1 displays the interconnectedness of the management, sport psychology, and broader psychology communities within the team literature. Ideally, pure integration would still allow for communities of knowledge to cluster together, but they would be interspersed with articles from other communities. We see this with regard to general psychology. Yellow general psychology nodes are interspersed between the sport psychology and management literatures. Yet, the red sport psychology and the blue management literatures remain mostly separate, only connected by several small streams of articles. This suggests that team research in management is not referencing sport journal articles sufficiently enough to draw them close on the plot. The reverse is also true, although we see some blue articles toward the

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

center and periphery of the red cluster indicating that sport psychology may be doing a better job of integrating management work than management is doing integrating sport psychology work.

The results of our cross-referencing analysis support the premise that while psychology acts as a bridge between the sport psychology and management literature, independently these two communities rarely communicate. Additionally, both communities tend to be relatively self-contained. Of the 11,964 times general psychology articles were referenced, 6,103 (51%) were in general psychology journals. However, 79% of management references occur in management journals and 78% of sport psychology references occur in sport psychology journals. Moreover, the remainder of each community (20% for management and 17% for sport psychology) tend to funnel into general psychology journals; meaning that only 1% of management references occur in sport psychology journals and only 5% of sport psychology references occur in management journals. Still, because of the relative sizes of these communities (4,177 management vs. 824 sport psychology articles), this indicates that 7% of all team references in sport psychology journals come from management whereas only 0.6% of team references in management journals come from sport psychology. This indicates that the lack of communication between sport psychology and management may be more one-sided than our initial network plot indicated. In fact, 7% represents a decent-sized inflow of knowledge from the management community into sport psychology. However, the fact that only 0.6% of team references in management journals come from sport psychology indicates a significant opportunity to further integrate the study of sport teams into the teams literature in management.

To further address the bridging role of psychology in disseminating knowledge from sport psychology to management, and the temporal process inherent in this description, we tracked sequences of article references to determine how often sport psychology articles cited in

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

general psychology journals are then cited in management journals compared to sport psychology articles that are directly cited in management journals. We also conducted an identical analysis on the bridging role of psychology in disseminating knowledge from management to sport psychology. Results of these analyses supported our network plot. Psychology journals play a large role in bridging the gap between both management and sport psychology and between sport psychology and management, although the former occurs to a much greater degree.

Management articles directly cited sport psychology articles 120 times. However, management articles cited psychology articles that cited sport psychology articles 234 times. Therefore, general psychology articles accounted for 66% of the knowledge flow from sport psychology into management, while direct citations from sport psychology into management accounted for 34% of the knowledge flow between these fields. Alternatively, general psychology articles played a lesser though still important bridging role in disseminating knowledge from management to sport psychology. Sport psychology directly cited management articles 216 times, while it cited psychology articles that cited management articles 135 times. So, in this case, direct citations accounted for 62% of knowledge flow from management into sport psychology, while the bridging path made up 38% of this knowledge flow. Overall, these analyses indicate that psychology predominantly bridges work from sport psychology into management, whereas the sport psychology literature does a better job of directly incorporating management sources, although psychology still plays a significant bridging role, accounting for more than one third of future citations.

Cross-Referencing Over Time

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

To address our second question, regarding how this general trend has changed over time, we calculated the three-year rolling average of cross-referencing between sport psychology, management, and general psychology. Initially, our analysis did not identify much communication between communities; however, from 1994-1996 cross-community edges between all three disciplines began to emerge. As such, we present our cross-referencing analysis from this point forward in Figure 2. It is also notable that this aligns with the founding of several prominent sport psychology journals (e.g., *Journal of Sport and Exercise Psychology* (1996), *Journal of Sport Management* (1996)).

The data indicate that general psychology has been in constant communication with the sport psychology literature, generally representing 40-60% of the intercommunity citations between these fields. However, beginning in 2007 and continuing to increase after 2015, sport psychology has referenced management at a rate equal to general psychology and equal to the rate that general psychology references sport psychology. Unfortunately, the one communication pattern lagging behind is the rate management cites sport psychology. The data show that management journals generally neglected the sport psychology literature until the uptick from 1% to 8% between 2008 and 2014, and further increase to almost 12% in 2016 and 2017. This indicates increasing recognition of the contribution of sports work to broader team functioning, although there is still a long way to go. Overall, this analysis indicates that management work is becoming solidified in sport journals, yet sport has not made this same headway in management journals, despite appearing more prominently recently.

Top Cross-Referenced Articles

To delve deeper into the specifics underlying these trends, we identified the top 10 articles in our database 1) in management referencing sport psychology 2) in management

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

referencing management 3) in sport psychology referencing management, and 4) in sport psychology referencing sport psychology. These articles are displayed in Table 1 and support our previous observation regarding the rift between the sport team and organizational team literatures. Of the ten management articles most referenced in sport journals, six deal directly with sports issues, while four deal with broader theoretical issues such as team implicit and explicit processes, rivalry, and the mental models and motivational states that underlie those processes. Overall, this indicates that the sport literature is doing a fairly good job of balancing sport related references to the management literature with those addressing underlying theoretical points applicable to most teams. Still, it must be noted that the amount of the citations is low. The four broader articles have only been cited 19 times collectively across the sport team literature within our dataset. Additionally, only one of the articles, Marks, Mathieu, and Zaccaro's (2000) broad taxonomy of team processes, is also a top cited article in the team literature in management. Noticeably absent from sport psychology references are similarly impactful articles on important topics such as conflict (Jehn & Mannix, 2001), diversity (Harrison, Price, Florey, & Gavin, 2002), empowerment (Kirkman & Rosen, 1999), and virtual team communication (Jarvenpaa & Leidner, 1999).

The management literature is doing only marginally better at integrating the core of sport psychology as two of its top ten cross-community references are also two of the top ten in the sport psychology literature (Carron, Colman, Wheeler, & Stevens, 2002; Fletcher & Wagstaff, 2009). Mirroring this, eight of the top ten articles the management literature cites from sport psychology involve the sport context, although many of these articles build on broader themes such as transformational leadership (Callow et al., 2009), resilience (Morgan, Fletcher, & Sakar, 2003), organizational citizenship behavior (Aoyagi, Cox, & McGuire, 2008), and team building

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

interventions (Senécal, Loughead, & Bloom, 2008). This indicates that neither the management nor the sport psychology literature is doing a sufficient job of integrating the central theory-building components of each, although management appears to be doing slightly better. The low rates associated with these citations further reflect this point. Even when these literatures cite each other, they are not doing so to a great extent, despite increasing recent trends.

Topics Discussed Within Community

While our cross-referencing analysis clearly displays the failure to integrate team research between sport psychology and management, especially from sport psychology into management, some topics may account for the integration that has occurred more than others. To address this point, and thus our third research question, we analyzed the results of our topic modeling across communities in three ways. First, we analyzed which topics each community primarily discusses (see Table 2). Second, we analyzed the topics that most often appear within either management or sport psychology without appearing in the other (i.e. highest ratio of appearing in only one community. See Table 3). Finally, we analyzed which topics are most often referenced between communities (see Table 4).

Our first analysis indicates that while sport psychology and management focus on certain topics germane to their own community, there is a great degree of conceptual overlap in their foci. As expected, each community focuses on several unique topics relevant to its context. For example, management focuses on topics such as product development, customer service, entrepreneurship, and virtual teams, which do not appear as predominantly in the sport psychology literature; whereas sport focuses more on coaching. However, we also observe a large degree of overlap in the study of key team processes, collective states, and collective outcomes such as conflict/diversity, creativity, training, goal-setting, performance, learning, and

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

decision-making. This conceptual overlap supports our general argument that there is room for integration between sports and management, despite the current lack of communication between these communities identified in our initial analysis. Still, we see stronger focus on some elements within the sport psychology and management literatures respectively. Sport psychology focuses more heavily on cohesion, collective and self-efficacy, roles, and emotions; whereas management focuses more heavily on knowledge sharing, transformational leadership, and international culture.

Considering the topics with the highest ratio of appearing in either sport psychology or management (and not the other) further supports this argument. These ratios appear in Table 3. Each ratio indicates the degree to which a given topic appears in a given domain as compared to the other. For example, the topic of "management teams" appears 17 times more in management journals as compared to sport psychology journals and the topic "sports" appears 28 times more in sport psychology journals than in management journals. While some topics focused in sports directly relate to that domain such as sports and coaching, many other topics have great potential to address lingering issues in the management literature such as motivational work surrounding self-regulation and social cognitive theory, work on team emotions including passion, work on team composition including that involving skill composition and roles, and work on helping and service climate. Likewise, some topics that more prominently appear in management directly deal with the study of organizations, while others such as international culture, knowledge sharing, voice, faultlines, and empowerment have the potential to help advance the study of sports teams. We provide examples of these benefits in the theoretical implications section of our discussion.

Topics Discussed Between Communities

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Our analysis of the topics most often cited between communities confirms that many of these topics remain within their primary community of study. These results are displayed in Table 4. Columns represent different patterns of cross-citation between communities. For example, the first column represents topics appearing in management journals that are referenced in sport psychology journals. The percentages next to each topic represent the amount that a particular topic is referenced between communities out of the overall amount of cross-referencing between those communities. So, of all the topics referenced from management into sport psychology, sports makes up 23.27% of those references. This analysis indicates that many of the major topics of conversation between the sport psychology and management are topics surrounding sports as a context and not necessarily topics underlying theoretically meaningful ways of understanding team composition, mechanisms, or outputs (Mathieu et al., 2019).

Further, if one compares the communication between sport psychology and management to that between these domains and psychology, differences emerge. For example, work from management on reward structure, empowerment, and virtual teams is being integrated into the general psychology literature, but has not been adopted into sport psychology. Alternatively, most work that has been transferred from sport psychology to the broader psychology audience has also been transferred to management, and mostly in the same order. This provides additional support that, despite the small amount of communication from sport psychology to management, the work being cited represents the broader sport psychology community pretty well.

Discussion

We began our investigation with four questions: To what extent is team research from sport psychology and management integrated? Has this integration changed over time? What specific topics have driven this integration? And, what topics represent promising opportunities

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

for future research? Our analyses uncovered some interesting trends and harsh truths. However, self-reflection is important for the growth of a field (Norder et al., 2018). Sports and organizations represent two of the primary contexts for teams, yet our data strongly support the premise that their findings are not well integrated. Still, our longitudinal analysis provides some hope. In the past five years sport psychology has begun to cite management work in parity with the general psychology literature. Additionally, the management literature has cited more sport psychology work recently. Finally, we found that psychology acts as a bridge between these fields, yet it is a bridge that rarely gets crossed. Whereas the sport psychology and management literatures often communicate with more general psychology work, they rarely communicate with each other directly.

Importantly, our analyses indicate that the lack of communication between these two fields may often result in the underleveraging of each as a unique and beneficial context to feed back into generalized theory development. Sporting events occur in relatively controlled environments where participants are motivated to perform well (Staw & Hoang, 1995), allowing for more ideal isolation of the constructs that makeup theoretical models of team functioning (Wolfe et al., 2005). On the field (or rink, pitch, track, diamond, etc.) both teams play by the same set of agreed upon rules, interact within a defined boundary, have the same number of players with the same equipment, and interact for a predetermined or agreed upon period of time (Day et al., 2012). In organizations, it is rare to find two teams similar in these constraints. Still, this variety is the benefit of organizational data – it is more nuanced and varied in terms of task constraints, team membership, and environmental factors allowing for observation and theory development incorporating a wide range of variables (Mathieu et al., 2019). Sports also allow for the development of more valid theories based on team behavioral change instead of the proxies

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

which are often relied on in organizational work (Wolfe et al., 2005), and allows for the collection of the clear longitudinal data needed for the development of more nuanced theories of team dynamics (Cronin, Weingart, & Todorova, 2011; Waller, Okhuysen. & Saghafian, 2016). Viewing team research holistically, as an interdisciplinary science of teams, would allow these domains to leverage the theoretical and empirical advantages of the other to develop a more complete understanding of team-based phenomena.

Theoretical Implications

To this point, the lack of communication between the sport psychology and management literatures has significant implications because these literatures have the potential to inform each other on lingering theoretical questions. Our analyses comparing topics discussed within and between communities highlight several areas where further integration is likely to be beneficial. Topics that represent advantageous areas for integration between the sport psychology and management communities are those that 1) are discussed at a high rate within one community but not the other (Tables 2 and 4), or 2) are being discussed in both, but are not being discussed between them (Table 3). Using these criteria, below we highlight one instance where each literature could incorporate novel work from the other to develop broader theory.

First, our analysis and recent work in each community indicates that management should do a better job integrating sport psychology work on team emotion. Following initial models assuming that for team emotion to exist a certain level of agreement must exist among team members (George, 1996), the team emotions literature in management has developed assuming that team members affective states converge over time (Emich, 2020; Emich & Lu, 2020). However, work in sport psychology has already moved past this assumption to testing more configurational models of team affect assuming that team members' everyday experiences and

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subjective interpretations can influence their emotional states to differ. For example, Totterdell (2000) used pocket computers to track cricket players and show that although team member mood tended to come together, a more complex model underlies this tendency based on age, team commitment, and susceptibility to emotional contagion. Work in this vein has also shown that discrete emotions such as passion, which has been consistently linked (in the sport psychology literature) to important outcomes such as well-being (Vallerand, et al., 2006) can transfer from team leaders (i.e. coaches) to team members (i.e. players) impacting their relationship and affective experiences (Lafrenière, Jowett, Vallerand, & Carbonneau, 2011). Management research would be wise to consider similar models of team emotion including aspects of divergence and discrete emotion.

Similarly, the management literature has spent a great deal of effort over the past ten years differentiating the processes that may lead teams to fracture, ultimately harming performance, in a subliterature on faultlines in teams. Growing out of diversity research, group faultlines refer to "hypothetical dividing lines that may split a group into subgroups based on one or more attributes" (p. 328, Lau & Murnighan, 1998). Although some sport psychology scholars have started to report that subgroups exist in many sports teams and impact team performance significantly (Martin, Wilson, Evans, & Spink, 2015; Martin, Evans, & Spink, 2016; Wagstaff, Martin & Thelwell, 2017), most existing research relies on players' perceptions (Martin et al., 2015; Wagstaff et al., 2017), coaches' perceptions (e.g., Martin et al., 2016), or qualitative methodology. None of this work on subgroups substantially incorporates the concept of faultlines.

One recent study published in the *Journal of Applied Psychology* has begun the process of applying management work on faultlines to sports. It finds that team and organizational

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Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

faultlines negatively affect MLB team performance (Bezrukova, Spell, Caldwell, & Burger, 2016). Given this impact, it is also important to note that the management literature has identified several moderators of the negative impact of faultline strength on team performance such as prodiversity beliefs (Homan et al., 2010), team tenure (Barkema & Shvyrkov, 2007), shared objectives (van Knippenberg, Dawson, West, & Homan, 2011), and team identification (Bezrukova et al., 2016). Given this focus, and the importance of subgroups and faultlines to sport team dynamics, this represents a fruitful area for future integration.

The topics of team emotion and faultlines represent two of many possible areas for advantageous future integration indicated by our analysis including management integrating more sport psychology work on gender and team composition and sport psychology integrating more management work on international culture, knowledge sharing, and empowerment. Additionally, researchers should keep in mind the opportunity for the collaborative development of topics not prevalent in either community (and thus not identified in our analysis), but still important to team functioning.

Practical Implications

On that note, structural factors likely play a role in our observed lack of integration between sport psychology and management. For example, while psychology and management are commonly divided in universities – by both department and college – sports management is also commonly divided from more general management, and work on teams often resides in separate communications or social psychology programs, among others (Norder et al., 2018). Additionally, differences in language germane to management and sports compounds this natural divide (Fiore, 2008). While these differences certainly exist, commonalities in theory, methods, and analysis techniques should make it easier to bridge the gap between team scholars.

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

It is also important to recognize that management is a broad field. This size demands a great deal of attention and thus management researchers may be less likely to look to outside disciplines for research insights, as our analyses indicate. This may also lead to the transference of general theory as opposed to nuanced findings when outside work is integrated, which our analyses also support. More broadly, management scholars need to stop viewing team research in the context of sports as a limitation – as is often done (Wolfe et al., 2005). Instead, it is more important to consider how the factors underlying sports team performance fit into broader models of team functioning. Additionally, sport is not monolith. Although most sports teams are considered performance teams (Crown, 2000) or action teams (Sundstrom, De Meuse, & Futrell, 1990), they vary on a variety of dimensions applicable to organizational work and broader team science including interdependence, team size, and role differentiation among others (Katz, 2001).

Alternatively, sport psychologists should continue their integration of the team literature in management into their own work and make specific effort to integrate management work not explicitly referencing sports. The increasing citation count of sport psychology work in management journals, especially in the last 10 years, indicates that management scholars are becoming more open to work involving sports. Now sport scholars must walk through the door and look to continue conversations with management researchers. Admittedly, to this point management scholars have been doing most of the talking and sport scholars have been doing most of the listening. It is time for management scholars to listen and for sport scholars to talk, so we can have a real conversation.

Finally, while it may be difficult to change incentive structures and department configurations quickly, there are some more nearby steps that could be taken to facilitate the integration of sport psychology and management team research. For example, many journals

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Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

have consistent calls for special issues. Having scholars interested in the interdisciplinary study of teams edit these issues and seek out authors from different disciplines to engage in conversation may help build communication pathways between fields. Universities with speaker series could also consider bringing in sport and organizational scholars to speak on their perspectives of a given issue. Scholars could also attend and apply to present at conferences outside their primary field to facilitate interdisciplinary conversation, or attend conferences that are explicitly interdisciplinary such as INGRoup. Finally, scholars should recognize that interdisciplinary understanding improves the innovativeness of one's work and understanding of one's field of study (Boh, Evaristo, & Ouderkirk, 2014)

Methodological Implications

Past work using citation network analysis laid the foundation for this paper by evaluating the level of interconnection related to specific sub-topics within sport psychology (Bruner et al., 2013; Bruner et al., 2010; Gustafsson, et al., 2014). Past work also used citation networks to identify sub-communities that were not highly linked for a given phenomenon as well as influential articles within given fields. The size of the literature related to each of these phenomena in sport was small enough to make manual evaluation reasonable. A few highly cited central papers could provide a rather detailed overview of the literature. Our exploration of team science and the integration between sport psychology and management expanded the number of articles to 6,974, more closely relating to the scope of work by Lefebvre, Bloom, and Loughead (2020), and creating several methodological problems to replicating the analyses of these previous studies. First, the scale of articles required us to use specialized algorithms to visualize communities for very large networks. Second, the scale of articles, beyond what can be reasonably reviewed manually, pushed us to use machine learning techniques for our content

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Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

analyses. Using both citation network analysis and topic modeling enabled us to assess the integration of community structure and content and do so in a replicable and scalable manner.

Limitations

Despite SCOPUS being the largest centralized database of article listings, not all published articles are indexed and thus there is the potential for additional published articles to affect our results. However, given the overarching size of the database and our use of 6,974 articles, we believe our findings are most likely robust. Similarly, indexed articles may not initially include a digital reference list. This is particularly prevalent in the most recent years and the oldest years where articles are being converted into digital form. Of the 13,111 extracted articles, 1,142 (8.7%) did not have a reference list. Given this relatively low percentage and the size of the article network we did analyze, we believe this limitation is unlikely to significantly alter our findings. Additionally, although journal level categorization is a generally accepted technique for classifying articles into domain categories, it assumes ecological homogeneity within a journal. Though generally consistent, we did find some work specific to the sport context published in management or general psychology journals. We captured some of this through our manual review of papers that were highly cited across communities. Future work would benefit from comparing our findings to those employing alternative methods of community detection in citation networks.

Conclusion

Our study provides the first comprehensive analysis of the integration between the sport psychology and management literatures on teams. Our data strongly support the premise that these fields are not well integrated, despite studying many of the same underlying phenomena (Wolfe et al., 2005) and despite the benefits of interdisciplinary work to the development of a

broader team science (Norder et al., 2018). Still, times may be changing. In the last ten years, these fields have begun to reference each other, although this still occurs at low levels, especially management's referencing of sport psychology. We hope our analysis helps researchers from both sport psychology and management recognize their lack of communication, understand the benefits of future integration, and identify topics where integration is likely to be immediately beneficial.

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

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Accepted Manuscript
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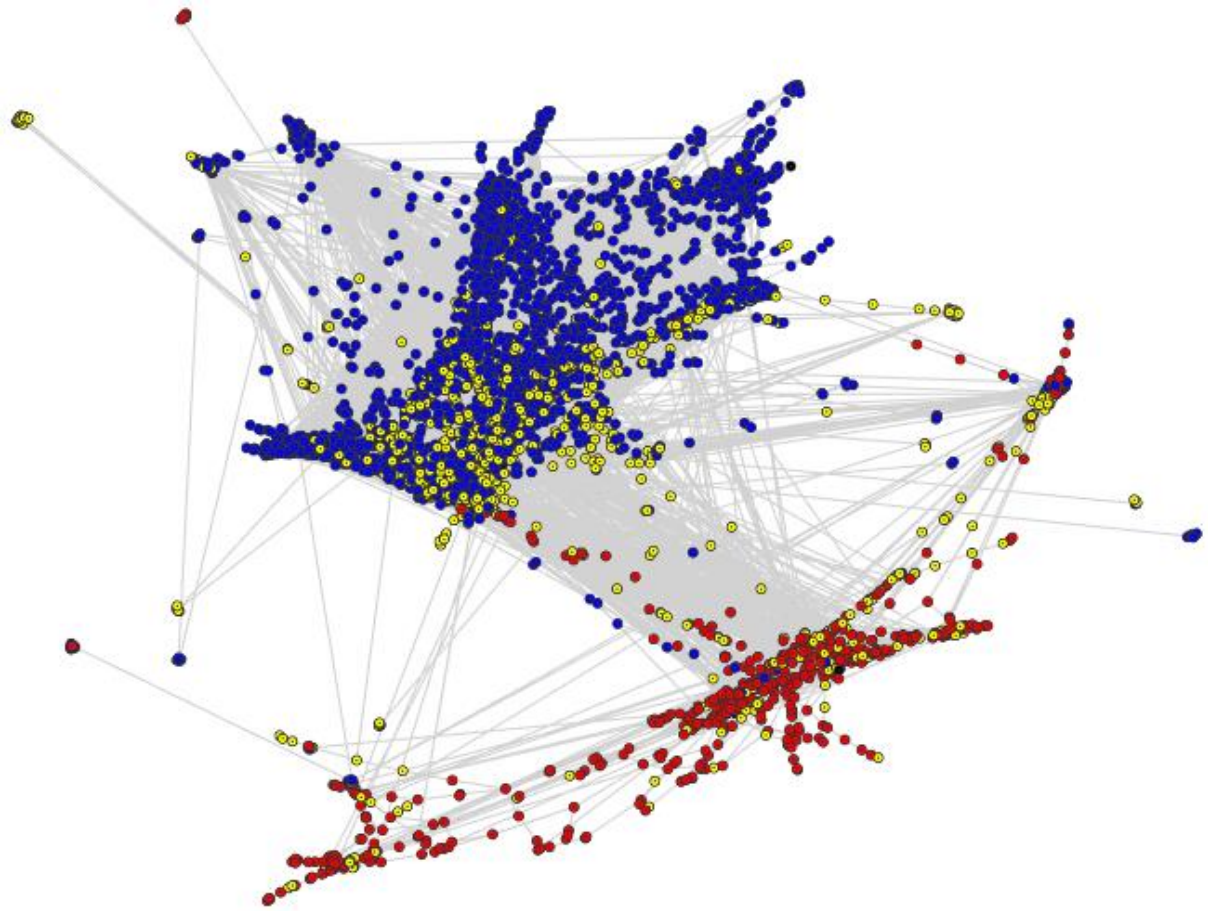
Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Figure 1

Visualization of Team Literature Citation Network



Note. Blue indicates management journals. Red indicates sport psychology journals. Yellow indicates general psychology journals. Black indicates "other" journals.

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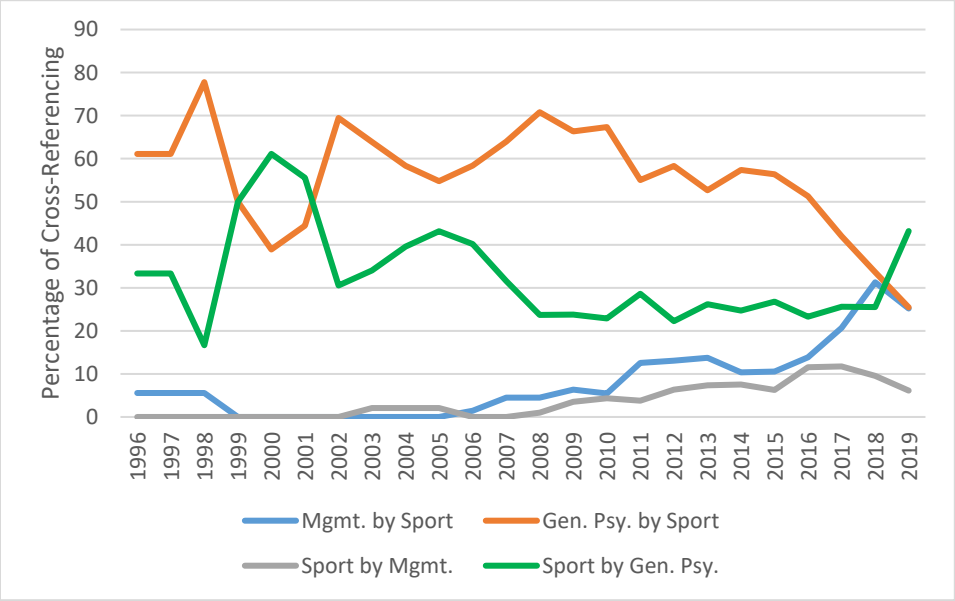
Figure 2

Three-year Rolling Average of Percentage of Cross-Referencing between Sport Psychology, Management, and General Psychology.



Note. Percentages indicate the number of cross-references in a particular direction out of all cross-references during a given year.

Accepted Manuscript
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Table 1.

Top Articles Referenced Within and Between Sport Psychology and Management

Top 10 Sport Psychology Team Articles Referenced in Management	**Times Cited**	**Top 10 Sport Psychology Team Articles Referenced in Sport Psychology**	**Times Cited**
Carron, A. V., Colman, M. M., Wheeler, J., & Stevens, D. (2002). Cohesion and performance in sport: A meta analysis. *Journal of Sport & Exercise Psychology*.	8	Carron, A. V., Colman, M. M., Wheeler, J., & Stevens, D. (2002). Cohesion and performance in sport: A meta analysis. *Journal of Sport & Exercise Psychology*.	46
Fletcher, D., & Wagstaff, C. R. (2009). Organizational psychology in elite sport: Its emergence, application and future. *Psychology of Sport and Exercise.*	4	Yukelson, D. (1997). Principles of effective team building interventions in sport: A direct services approach at Penn State University. *Journal of Applied Sport Psychology*.	30
Callow, N., Smith, M. J., Hardy, L., Arthur, C. A., & Hardy, J. (2009). Measurement of transformational leadership and its relationship with team cohesion and performance level. *Journal of Applied Sport Psychology.*	4	Gould, D., Guinan, D., Greenleaf, C., Medbery, R., & Peterson, K. (1999). Factors affecting Olympic performance: Perceptions of athletes and coaches from more and less successful teams. *The Sport Psychologist*.	26
Morgan, P. B., Fletcher, D., & Sarkar, M. (2013). Defining and characterizing team resilience in elite sport. *Psychology of Sport and Exercise.*	3	Fletcher, D., & Wagstaff, C. R. (2009). Organizational psychology in elite sport: Its emergence, application and future. *Psychology of Sport and Exercise.*	20
Fletcher, D., & Arnold, R. (2011). A qualitative study of performance leadership and management in elite sport. *Journal of Applied Sport Psychology.*	3	Holt, N. L., & Sparkes, A. C. (2001). An ethnographic study of cohesiveness in a college soccer team over a season. *The Sport Psychologist.*	19
Smith, A. C., & Stewart, B. (2007). The travelling fan: Understanding the mechanisms of sport fan consumption in a sport tourism setting. *Journal of Sport & Tourism*.	3	Heuzé, J. P., Sarrazin, P., Masiero, M., Raimbault, N., & Thomas, J. P. (2006). The relationships of perceived motivational climate to cohesion and collective efficacy in elite female teams. *Journal of Applied Sport Psychology*.	18
Senécal, J., Loughead, T. M., & Bloom, G. A. (2008). A season-long team-building intervention: Examining the effect of team goal setting on cohesion. J*ournal of Sport and Exercise Psychology.*	2	Woodman, T., & Hardy, L. (2001). A case study of organizational stress in elite sport. *Journal of Applied Sport Psychology.*	15
Aoyagi, M. W., Cox, R. H., & McGuire, R. T. (2008). Organizational citizenship behavior in sport: Relationships with leadership, team cohesion, and athlete satisfaction. *Journal of Applied Sport Psychology*.	2	Vazou, S., Ntoumanis, N., & Duda, J. L. (2006). Predicting young athletes' motivational indices as a function of their perceptions of the coach-and peer-created climate. *Psychology of Sport and Exercise*, 215-233.	14
Bloom, G., Stevens, D., & Wickwire, T. (2003). Expert coaches' perceptions of team building. *Journal of Applied Sport Psychology.*	2	Balaguer, I., Duda, J. L., Atienza, F. L., & Mayo, C. (2002). Situational and dispositional goals as predictors of perceptions of individual and team improvement, satisfaction and coach ratings among elite female handball teams. *Psychology of Sport and Exercise*.	14
Wagstaff, C. R., Hanton, S., & Fletcher, D. (2013). Developing emotion abilities and regulation strategies in a sport organization: An action research intervention. *Psychology of Sport and Exercise*.	2	Fletcher, D., & Hanton, S. (2003). Sources of organizational stress in elite sports performers. *The Sport Psychologist.*	14
Top 10 Team Articles in Management Referenced in Sport Psychology	**Times Cited**	**Top 10 Team Articles in Management Referenced in Management**	**Times Cited**

Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*.	6	Bantel, K. A., & Jackson, S. E. (1989). Top management and innovations in banking: Does the composition of the top team make a difference?. S*trategic Management Journal*.	225
Berman, S. L., Down, J., & Hill, C. W. (2002). Tacit knowledge as a source of competitive advantage in the National Basketball Association. *Academy of Management Journal*.	5	Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*.	192
Rico, R., Sánchez-Manzanares, M., Gil, F., & Gibson, C. (2008). Team implicit coordination processes: A team knowledge–based approach. *Academy of Management Review*.	5	Amason, A. C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of Management Journal.*	130
Kilduff, G. J., Elfenbein, H. A., & Staw, B. M. (2010). The psychology of rivalry: A relationally dependent analysis of competition. *Academy of Management Journal*.	4	Hoegl, M., & Gemuenden, H. G. (2001). Teamwork quality and the success of innovative projects: A theoretical concept and empirical evidence. *Organization Science*.	106
Wolfe, R. A., Weick, K. E., Usher, J. M., Terborg, J. R., Poppo, L., Murrell, A. J., ... & Jourdan, J. S. (2005). Sport and organizational studies: Exploring synergy. *Journal of Management Inquiry*.	4	Bunderson, J. S., & Sutcliffe, K. M. (2002). Comparing alternative conceptualizations of functional diversity in management teams: Process and performance effects. *Academy of Management Journal.*	97
Runyan, R. C., Carlson, B. D., Donavan, D. T., & Cumiskey, K. J. (2009). Consumer-brand relationships in sport: brand personality and identification. *International Journal of Retail & Distribution Management*.	4	Jehn, K. A., & Mannix, E. A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. *Academy of Management Journal*.	93
Katz, N. (2001). Sports teams as a model for workplace teams: Lessons and liabilities. *Academy of Management Perspectives*.	4	Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task performance: Changing effects of surface-and deep-level diversity on group functioning. *Academy of Management Journal*.	93
Theodorakis, N. D., & Alexandris, K. (2008). Can service quality predict spectators' behavioral intentions in professional soccer?. *Managing Leisure*.	4	Kirkman, B. L., & Rosen, B. (1999). Beyond self-management: Antecedents and consequences of team empowerment. *Academy of Management Journal*.	82
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Accepted Manuscript
Version of Record at: https://doi.org/10.1016/j.psychsport.2020.101732

Table 2.

Top 10 Topics Referenced Within Each Community

Topic Rank	Management	Sport Psychology	General Psychology	Other
1	Performance (21.72%)	Sport (56.57%)	Performance (19.22%)	Training (10.23%)
2	Product Development (6.50%)	Performance (8.28%)	Sports (18.16%)	Performance (7.91%)
3	Creativity (4.83%)	Goal Setting (4.44%)	Training (8.61%)	Project Management (3.44%)
4	Conflict/Diversity (3.93%)	Training (3.84%)	Goal Setting (7.13%)	Goal Setting (2.57%)
5	Sport (3.47%)	Cohesion (1.86%)	Creativity (6.36%)	Decision Making (2.32%)
6	Training (2.79%)	Coaching (1.15%)	Conflict/Diversity (5.96%)	Roles (2.02%)
7	Goal Setting (2.18%)	Decision Making (0.92%)	Management Teams (2.28%)	Sport (1.87%)
8	Decision Making (1.53%)	Collective Efficacy (0.84%)	Learning (1.69%)	Product Development (1.38%)
9	Customer Service (1.35%)	Management Teams (0.63%)	Healthcare (1.58%)	Shared Mental Models (1.36%)
10	Learning (1.28%)	Creativity (0.63%)	Decision Making (1.45%)	Coordination (1.19%)
11	Entrepreneurship (1.24%)	Conflict/Diversity (0.63%)	Transformational Leadership (1.28%)	Task Interdependence (1.06%)
12	Knowledge Sharing (1.07%)	Self-Efficacy (0.60%)	Collective Efficacy (0.78%)	Cooperation (1.01%)
13	Transformational Leadership (0.94%)	Roles (0.55%)	Self-Efficacy (0.71%)	Family Business (0.91%)
14	Virtual Teams (0.79%)	Emotion (0.54%)	Shared Mental Models (0.71%)	Creativity (0.80%)
15	International Culture (0.72%)	Learning (0.53%)	Cohesion (0.70%)	Conflict/Diversity (0.80%)

Note. Percentages are the number of times a particular topic appeared in articles within each community out of the total number of topics discussed in that community.

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Table 3

Topics with the Highest Ratio of Appearing in Either Management or Sport Psychology

Topic Rank	Management	Sport Psychology
1	Management Teams (17:1)	Sport (28:1)
2	Product Development (14:1)	Coaching (12:1)
3	Virtual Teams (14:1)	Self-Regulation (5:1)
4	Creativity (19:1)	Competition (4:1)
5	Entrepreneurship (11:1)	Emotion (4:1)
6	Organizational Structure (8:1)	Passion (3:1)
7	International Culture (8:1)	Collective Efficacy (3:1)
8	Knowledge Sharing (7:1)	Gender (2.5:1)
9	Conflict/Diversity (6:1)	Service Climate (2.5:1)
10	Ambidexterity (6:1)	Helping (2:1)
11	Boundary Spanning (4:1)	Goal Setting (2:1)
12	Voice (3:1)	Skill Composition (1.5:1)
13	Reward Structure (3:1)	Feedback (1.5:1)
14	Faultlines (3:1)	Self-Efficacy (1.5:1)
15	Empowerment (3:1)	Roles (1.5:1)

Note. Ratios refer to the amount a particular topic appears within one domain as compared to the other domain.

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Table 4

Top 10 Topics Referenced Between Each Community

Topic Rank	Mgmt => Sport Psychology	Sports Psychology => Mgmt	Mgmt => General Psychology	Sports Psychology => General Psychology
1	Sport (23.27%)	Sport (44.84%)	Performance (20.90%)	Sport (49.80%)
2	Performance (17.65%)	Performance (10.74%)	Creativity (13.01%)	Performance (13.14%)
3	Management Teams (6.64%)	Goal Setting (4.86%)	Conflict/Diversity (12.68%)	Goal Setting (10.33%)
4	Training (5.27%)	Cohesion (4.68%)	Training (9.10%)	Cohesion (6.74%)
5	Creativity (4.71%)	Training (4.16%)	Management Teams (7.72%)	Training (4.72%)
6	Conflict/Diversity (4.71%)	Transformational Leadership (1.34%)	Goal Setting (7.09%)	Coaching (1.16%)
7	Goal Setting (4.54%)	Coaching (1.25%)	Sport (3.91%)	Collective Efficacy (1.14%)
8	Project Management (1.89%)	Creativity (1.18%)	Learning (2.10%)	Creativity (1.04%)
9	Learning (1.44%)	Management Teams (1.14%)	Decision Making (2.09%)	Conflict/Diversity (1.04%)
10	Decision Making (1.21%)	Conflict/Diversity (1.08%)	Virtual Teams (1.74%)	Roles (0.72%)
11	Shared Mental Models (1.21%)	Learning (0.97%)	Product Development (1.28%)	Service Climate (0.69%)
12	Customer Service (1.20%)	Roles (0.82%)	Transformational Leadership (1.13%)	Decision Making (0.64%)
13	Product Development (1.18%)	Decision Making (0.71%)	Self-Efficacy (1.08%)	Self-Regulation (0.57%)
14	Collective Efficacy (0.82%)	Collective Efficacy (0.68%)	Reward Structure (1.02%)	Helping (0.53%)
15	Self-Efficacy (0.57%)	Helping (0.48%)	Empowerment (0.93%)	Transformational Leadership (0.51%)

Note. Percentages are the number of times a particular topic appeared in articles within each community out of the total number of topics discussed in that community.