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A Decade of Research on Leadership and its Effects on Creativity-Innovation: A Systematic and Narrative Literature Review

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Abstract

Purpose – In this study, we review ten years of research delving into the connections between leadership, creativity, and innovation (L-C/I). Our main objective is to perform a systematic literature review to better understand the associations between leadership and innovation/creativity, analyzing the knowledge thus far developed that addresses the mechanisms through which the two phenomena are connected.

Theoretical framework – We present and analyze conceptual definitions for the three constructs involved in our review – leadership, creativity, and innovation. We also briefly highlight the main leadership theories and perspectives, their key conceptual elements, and their interface with creativity/innovation.

Design/methodology/approach – We applied a combination of systematic and narrative review methodologies together with bibliometrics, and the review is unprecedented in its focus, depth, and breadth. We examined a sample of 2,724 published articles on the L-C/I relationships, analyzing 113 papers in depth published in the top 27 management journals.

Findings – We observed an accelerated growth of research on the topic. Most studies address the effects of leadership on creativity, while its connections with innovation still need to be better understood. Transformational leadership is the main perspective adopted by researchers, but there has also been an emergence of studies applying the LMX, entrepreneurial, and positive leadership approaches. While some mediators and moderators have been explored, there remains the need to build comprehensive frameworks that are able to address the complexity of the issue. Transversal study designs predominate, and the few experimental studies mostly rely on student samples.

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Practical & social implications of the research – We discuss the possibilities and limitations of the present knowledge, synthesize existing gaps in the research, and offer direction to further expand the knowledge boundaries. We also contribute to fostering more systematic studies, which could avoid redundancies and unbridled construct proliferation, as well as to promoting the theoretical and methodological robustness that the field deserves.

Originality/value – The study applies a combination of systematic and narrative review methodologies together with bibliometrics, and it is unique in its focus, depth, and breadth, therefore making a distinguished contribution and consolidating the research with varied approaches, while also identifying gaps to inspire future research that could bring momentum to the field.

Keywords – Leadership, Creativity, Innovation, Literature Review

1 Introduction

Organizations are concerned with improving their processes and offers, but also with finding potential opportunities for advancements that strengthen and sustain their market position (Scheepers & Storm, 2019). Rapid technological development and intense global competition have made organizations increasingly dependent on creativity to survive and prosper (Gumusluoglu & Ilsev, 2009; Hennessey & Amabile, 2010; Yoshida, Sendjaya, Hirst, & Cooper, 2014). According to Ismail, Malone, and Van Geest (2015), the competition faced by many Fortune 500 companies no longer comes from geographical areas such as China or India, as in previous decades. Today, it comes from kids in garages who leverage technology exponentially and everywhere. To face the challenges of disruption and competition, companies depend on effective leadership, capable of leading people to transform and adapt products, services, and business processes in volatile, uncertain, complex, and ambiguous contexts (Narayandas & Moldoveanu, 2019).

In previous reviews, leadership has been routinely appraised as an important antecedent of creativity and innovation, but their approach has been mostly descriptive, presenting summaries to enable future research (Anderson, De Dreu, & Nijstad, 2004; Anderson, Potočnik, & Zhou, 2014; Rank, Pace, & Frese, 2004; Zhou & Shalley, 2003; Crossan & Apaydin, 2010; Zhou & Su, 2010). At one end there is leadership, a determining factor for the innovation produced by individuals, teams, and organizations (Hughes, Lee, Tian, Newman, & Legood, 2018), driving them to achieve competitive advantage (Anderson et al., 2004; Zhou & Shalley, 2003), and presenting an intriguing social science puzzle (Antonakis, 2017). At the other end, there is innovation, widely regarded as a critical source of competitive advantage and performance in an increasingly changing environment (Sethibe & Steyn, 2016). Nevertheless, critical questions remain unanswered. What kind of leadership favors creativity and innovation? How does the behavior of leaders influence these two processes? What are the key connections between leadership and innovation that bridge these distinct phenomena?

In this study, we review ten years of research examining the connections between leadership, creativity, and innovation (L-C/I). Our main objective is to perform a systematic literature review to better understand the associations between leadership and innovation/creativity, analyzing knowledge thus far developed that addresses the mechanisms through which the two phenomena are connected. We explore research developed in the last decade in the management and business administration areas, observing the evolution of publication volume during the period and citation rankings by journals, authors, and country affiliation. We investigate in greater detail studies published in the top 27 journals in the field (Fischer, Dietz, & Antonakis, 2017), emphasizing the main theories/perspectives applied by researchers and observed connections between leadership and creativity/innovation at different levels of analysis, as well as the main mediators and moderators addressed. We also analyze the existing research from a methodological perspective, considering study designs and methodological issues.

The study applies a combination of systematic and narrative review methodologies together with bibliometrics, and it is unique in its focus, depth, and breadth, therefore making a distinguished contribution and consolidating the research with varied approaches while also identifying gaps to inspire future research that could bring momentum to

the field. We also discuss the possibilities and limitations of the present knowledge, synthesize existing gaps in the research, and offer direction to further expand the knowledge boundaries. We also contribute to fostering more systematic studies, which could avoid redundancies and unbridled construct proliferation, as well as promoting the theoretical and methodological robustness that the field deserves.

In the first section, we present and analyze conceptual definitions for the three constructs involved in our review (L-C/I). We also briefly highlight the main leadership theories and perspectives, their key conceptual elements, and their interface with creativity/innovation. In the second section, we present the methodological approach applied in our review, our data collection strategy, along with its stages and criteria. The results are presented through a narrative review accompanied by a critical assessment and discussion. The current stage of leadership research and its relationship with C/I are described, highlighting the most cited authors in the last decade, as well as the geographic distribution of publications, production volume, and trends. Then, measures to assess C/I and their different forms are identified. Finally, the most frequent study designs are identified, giving special attention to their inherent methodological issues. This way, we systematically present observations that, in addition to showing opportunities for future research, can also accelerate the production of new knowledge with greater theoretical and methodological rigor.

2 Leadership, Creativity, and Innovation

Leadership is one of the most relevant functions in society. It is also one of the most examined phenomena in social sciences and one of such complexity that there is still no specific and widely accepted definition (Antonakis & Day, 2017). Although there is a multitude of definitions and no agreement among scholars, it is important to adopt a comprehensive definition that supports this paper's theoretical basis. Therefore, according to Antonakis and Day (2017, p. 5):

> Leadership is a formal or informal contextually rooted and goal-influencing process that occurs between a leader and a follower, groups of followers, or institutions. The science of leadership is the systematic study of this process and its outcomes, as well as how this process depends on the leader's traits and behaviors, observer inferences about the leader's characteristics, and observer attributions made regarding the outcomes of the entity led.

Comprehensive reviews of the leadership literature have been presented in recent years. Lord, Day, Zaccaro, Avolio, and Eagly (2017) reviewed the leadership research published in the *Journal of Applied Psychology* over a period of 99 years (1917-2015), describing in detail the field's dramatic increases in sophistication throughout the years, and the breadth of knowledge on topics such as leader-member exchange and gender, ethical, abusive, charismatic, and transformational leadership. Meuser et al. (2016) reviewed 864 articles on leadership published in ten important journals over a period of fourteen years (2000-2013). They used graphical network analysis to assess the field's rich theoretical landscape, showing that it is ready for more effective and unified research through theoretical integration.

In their study, Dinh et al. (2014) used a process-oriented structure to review 752 articles on leadership also published in ten journals over a period of thirteen years (2000-2012). The authors identified leading for creativity, innovation, and change as a noteworthy thematic category that saw significant growth in research over the period, and one in which conceptualizations have spread through different levels of analysis, i.e., at the event, individual, dyad, group, and organizational levels. Zhao and Li (2019) conducted a bibliometric analysis of leadership studies over 28 years (1990-2017), using software tools to code and organize 2,115 articles, visually representing the taxonomies of 56 topics of popular leadership research. They also observed a remarkable increasing trend in studies linking leadership to creativity and called for fine-grained review studies on the connections between leadership and creativity. Gardner et al. (2020) observed the evolution of the field with the emergence of new characters, methodologies, and theories in the last ten years (2010-2019) in publications in *The Leadership Quarterly*. These authors highlight that although research in the start-up niche emerged in the period, more theoretical and empirical attention should be given to the issue of innovation in leadership studies, given its strategic impact on businesses.

Leadership seems to play a key role in enabling innovation as a process and in maintaining the drive for innovation as a result in companies (Crossan & Apaydin, 2010) and leaders seem to play an important role in the various possible contextual factors that can affect creative

team processes (Anderson et al., 2014; Harvey & Kou, 2013; Mumford, Scott, Gaddis, & Strange, 2002; C. E. Shalley & L. L. Gilson, 2004; Tierney, 2008). Therefore, before proceeding, it is important to define and explain the differences between creativity and innovation.

Creativity refers to the production of new and useful ideas by an individual or group of individuals working together (Madjar, Oldham, & Pratt, 2002; Zhou & Shalley, 2003). Recently, Shin and Zhou (2007) broadened the definition of creativity to the production of new and useful ideas about products, services, processes, and procedures presented by a group of people working in teams. As a social process (Koseoglu, Liu, & Shalley, 2017), creativity is considered an important determinant for organizations to innovate, survive, and thrive in a competitive and global marketplace (Zhou & Shalley, 2010).

The first definition of innovation was elaborated by Schumpeter in the late 1920s (Hansen & Wakonen, 1997). Although he clearly positioned his definition broadly in products, processes, and business models, debates still proliferate over various aspects of innovation itself: the need for it and its sufficiency (Pittaway, Robertson, Munir, Denyer, & Neely, 2004), its intentionality (Lansisalmi, Kivimaki, Aalto, & Ruoranen, 2006), its beneficial nature (Camison-Zornoza, Lapiedra-Alcami, Segarra-Cipres, & Boronat-Navarro, 2004), and its successful implementation and diffusion (Hobday, 2005; Klein & Knight, 2005). Since its launch, the Oslo Manual (OECD, 2005, p. 46) has become an important reference in innovation studies. Several countries and studies have adopted its recommendations for measuring innovation indicators. In its third edition, it provides the following definition for the phenomenon: "an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations."

While creativity was originally conceived as the generation of new ideas, innovation has been considered as the production of creative ideas as the first stage and their implementation as the second stage (C. E. Shalley & J. Zhou, 2008). At first, there was a certain subordination of creativity as a stage of innovation. In their review, Anderson, Potočnik, & Zhou (2014) proposed a definition in the business context that outlined and integrated creativity and innovation. However, Hughes et al. (2018) recently claimed that such definitions have limitations as they present creativity and innovation by their results and products, which according to the authors fails to describe the nature of each phenomenon and makes it almost impossible to differentiate them. Thus, Hughes et al. (2018, p. 551) present a new definition that attempts to better discriminate the two processes:

> Workplace creativity concerns the cognitive and behavioral processes applied when attempting to generate novel ideas. Workplace innovation concerns the processes applied when attempting to implement new ideas. Specifically, innovation involves some combination of problem/opportunity identification, the introduction, adoption or modification of new ideas germane to organizational needs, the promotion of these ideas, and the practical implementation of these ideas.

Although there is a consensus that mastering these mechanisms would be extremely positive, leadership, creativity, or innovation still cannot be deliberately and consistently produced, even when much desired.

3 Search and Methodological Strategies

Preliminary Criteria

The goal in this review is to present a comprehensive and analytical overview, rather than merely an empirical consolidation. Our view was intentionally broad and somewhat led to sacrificing depth in favor of breadth of empirical literature. To review the current literature, a comprehensive search for leadership studies was first conducted in Scopus using the criterion of only searching for articles published in journals in English with the word "leadership" in their titles, abstracts, and keywords. To this end, the bibliometric method was chosen as a technique to examine the universe of a decade of publications, covering the period from January 2009 to December 2018 in order to verify the main theoretical frameworks that guide their production and main intersections with the theme of creativity and innovation.

Scopus was intentionally chosen as the basis for the research as it is the largest database of peer-reviewed abstracts and citations in scientific journals, books, and conference papers. In addition, it provides a broad overview of global and interdisciplinary scientific information with content that includes more than 5,000 peer-reviewed

editors selected by an independent content review board (https://www.elsevier.com/solutions/scopus).

Set 1 – A Decade of Leadership

The initial data processing using the keyword "leadership" resulted in 60,837 papers covering leadership research in the last decade.

Set 2 – Social Sciences, Business Management & Accounting, and Psychology

Using a second filter, the search was limited to the fields of Social Sciences, Business Management & Accounting, and Psychology, producing a total of 37,058 articles.

Set 3 – Query

The third round used a research query to identify L-C/I intersections and find the raw material for the complete analysis and review. In this stage, 2,757 articles were identified.

Set 4 – Cleaning Process

From the sample of 2,757 articles, 33 articles were identified that did not have all the necessary requirements to continue in the process and thus needed to be excluded. For example, we found articles that did not have the authors' names, duplicate articles, articles that were not written in English, and articles not found in the search portal of their respective journals. At the end of this cleaning step, a sample of 2,724 articles was obtained.

Set 5 – Top 27 Journals

The fifth filter aimed to make the systematic review feasible and tightly focused. In this sense, the most recent criteria (Table 1) were followed for choosing journals for systematic reviews on leadership studies (Fischer et al., 2017), with a focus on journals with the highest impact factors over the last five years, which were as follows:

After this step, a sample of 124 articles (Set 5) was obtained.

Final Set

In this final step, the 124 articles were manually downloaded and, after a detailed review and given the plurality of meanings incorporated in the term "innovation" (Crossan & Apaydin, 2010), the need for a new final cleaning was identified. Eleven articles were found in which the research object was outside interpersonal leadership. For example, there were several articles dealing with innovative brands and products that led markets, prospects for patenting products, open product-focused innovation, and R&D innovation. Thus, a final sample of 113 papers (Appendix A) was obtained and analyzed in detail.

It is relevant to note that among the 113 papers reviewed, 46 articles were also analyzed by Hughes et al. (2018) in a recent review study published by *The Leadership Quarterly*. Noting that the criteria and paths followed to gather and select the extant literature were different, a number of publications in our samples still overlap, indicating consistency between the approaches.

Table 1
Set 5 and Top Journals

Top 27 Journals (Fischer, Dietz, & Antonakis, 2017)	
1. Academy of Management Journal	15. Human Resource Management Review
2. Journal of Management	16. Journal of Occupational and Organizational Psychology
3. Journal of Applied Psychology	17. Research in Organizational Behavior
4. Administrative Science Quarterly	18. Management Science
5. Organization Science	19. Human Relations
6. Personnel Psychology	20. Academy of Management Learning & Education
7. Journal of International Business Studies	21. Management and Organization Review
8. Strategic Management Journal	22. Group and Organization Management
9. Journal of Management Studies	23. Human Resource Management Journal
10. International Journal of Management Reviews	24. Human Resource Management
11. Academy of Management Perspectives	25. The Leadership Quarterly
12. Journal of Organizational Behavior	26. Journal of Leadership and Organizational Studies
13. Organizational Behavior and Human Decision Processes	27. Journal of Managerial Psychology
14. Organization Studies	

Figure 1 illustrates the methodological macroprocess applied to obtain the 113 articles that compose this research sample.

4 Findings & Discussion

We begin this section by presenting the field's frontiers, the evolution of research in the last decade, as well as the most important authors and journals driving knowledge in the field. Then we move on to identifying key dependent variables and discuss the relative emphasis on creativity and innovation among the studies. The third topic is leadership perspectives, where the different classifications of leadership are analyzed in terms of their influence on creativity and innovation. Then, we present the methods associated with this stream of research. The section concludes with an analysis of mediators and moderators addressed in the literature.

4.1 Frontiers

Seen separately, leadership and innovation prove to be very broad fields of scientific research. While innovation-creativity is considered the frontier for business success and survival, it is intriguing to find that only 7.35% of global research focuses on the fusion of leadership and innovation-creativity. Comparatively, we found that the publication of research on L-C/I has grown increasingly over the past ten years (134% from 2009 to 2018), faster than the overall research on leadership alone (93% between 2009 and 2018). This may signal the growing tendency of researchers to better understand the leadership and creativity-innovation triad, which has been shown to be crucial in the business environment. Figure 2 shows a comparison between the absolute growth of publications and their respective percentages. The significant growth in leadership and innovation-creativity research in the last decade can be confirmed based on the percentage curve.

Table 2 lists the most cited authors in the sample, showing, for example, an increase in citations of the authors Zhang and Bartol (2010) (most cited in the ranking) between 2016 and 2018 (54% growth). This may show a significant increase in interest in research on the L-C/I interfaces, bearing in mind that innovation has been suggested as an essential part of new venture success (Baron & Tang, 2011) and that leadership is a determining factor for the innovation of individuals, teams, and organizations (Hughes et al., 2018), and it is a vital part of solving social science puzzles (Antonakis, 2017) and driving organizations to achieve competitive advantage (Anderson et al., 2004; Zhou & Shalley, 2003).In Table 3, we highlight the results on the top journals, authors, and countries for the two categories or filters that were used to structure the research: L-C/I (set 3) and the 27 main journals (set 5). In terms of countries, despite the rapid growth of research in Eastern countries, the United States still leads in both categories. In the first category, in which we focus on the overall

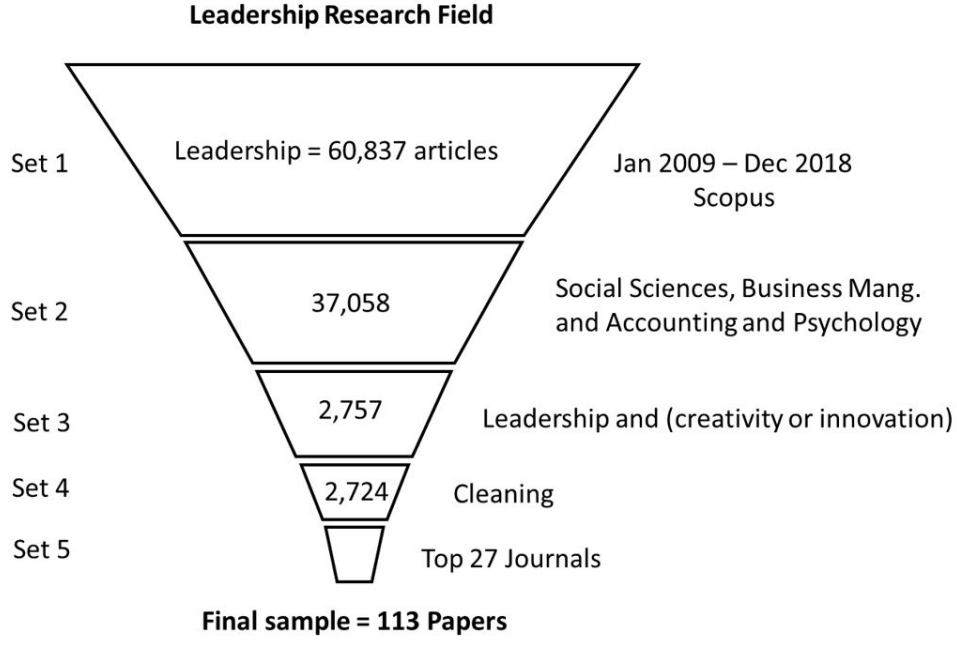

Figure 1. Methodological process used and stages (sets) performed during search process.

research on leadership and creativity-innovation, China ranks fourth, but in the 27 most impactful journals China rises to second position. In the same direction, but to less extent, the Netherlands also rises in the ranking. And in the opposite direction, the United Kingdom and Canada lose their positions between both categories. Considering the authors, we can highlight Mumford, M. D., who is present in both categories and leads the ranking in the category of the highest impact journals. Also deserving a mention is Carmeli, A., who appears in both categories. As for the journals, we highlight the presence of *The Leadership Quarterly* in a prominent position in both groups.

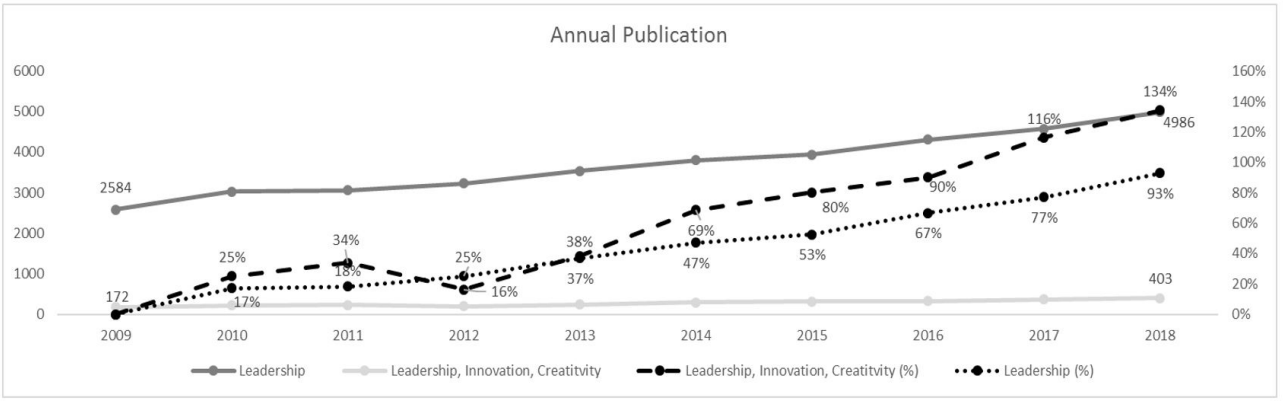

Figure 2. Evolution of annual publication volume – A comparative analysis between Leadership and Leadership and Innovation/Creativity.

Table 2
The Most Cited Authors in the Sample

	Title	Journal	Authors	Citations	FWCI
1	Linking Empowering Leadership And Employee Creativity: The Influence Of Psychological Empowerment, Intrinsic Motivation, And Creative Process Engagement	Academy of Management Journal	Zhang X. ; Bartol, K. M.	820	35.93
2	A Multi-dimensional Framework Of Organizational Innovation: A Systematic Review Of The Literature	Journal of Management Studies	Crossan, M. M. ; Apaydin, M.	753	20.07
3	Employee Learning Orientation, Transformational Leadership, And Employee Creativity: The Mediating Role Of Employee Creative Self-efficacy	Academy of Management Journal	Gong, Y. ; Huang, J. ; Farh, J.	579	21.27
4	Explaining The Heterogeneity Of The Leadership-innovation Relationship: Ambidextrous Leadership	The Leadership Quarterly	Rosing, K. ; Frese, M. ; Bausch, A.	256	6.82
5	Strategic Leadership For Exploration And Exploitation: The Moderating Role Of Environmental Dynamism	The Leadership Quarterly	Jansen, J. J. P. ; Vera, D. ; Crossan, M.	251	8.95
6	Creative Self-efficacy Development And Creative Performance Over Time	Journal of Applied Psychology	Tierney, P. ; Farmer, S. M.	222	5.65
7	The Bright-side And The Dark-side Of CEO Personality: Examining Core Self-evaluations, Narcissism, Transformational Leadership, And Strategic Influence	Journal of Applied Psychology	Resick, C. J. ; Whitman, D. S. ; Weingarden, S. M. ; Hiller, N. J.	202	3.35
8	Cognitive Team Diversity And Individual Team Member Creativity: A Cross-level Interaction	Academy of Management Journal	Shin, S. J. ; Kim, T. ; Lee, J. ; Bian, L.	199	13.41
9	The Dark Side Of Leadership: A Three-level Investigation Of The Cascading Effect Of Abusive Supervision On Employee Creativity	Academy of Management Journal	Liu, D. ; Liao, H. ; Loi, R.	189	10.29
10	Management Innovation And Leadership: The Moderating Role Of Organizational Size	Journal of Management Studies	Vaccaro, I. G. ; Jansen, J. J. P. ; Vandenbosch, F. A. J. ; Volberda, H. W.	179	11.95
11	Rotating Leadership And Collaborative Innovation: Recombination Processes In Symbiotic Relationships	Administrative Science Quarterly	Davis, J. P. ; Eisenhardt, K. M.	176	7.47

Notes. Citation ranking (113 final sample papers) and Scopus Field-Weighted Citation Impact (FWCI). Citations consider the sum of annual citations from 2009 to 2018.

Table 2
Continued...

	Title	Journal	Authors	Citations	FWCI
12	Complexity Leadership In Bureaucratic Forms Of Organizing: A Meso Model	The Leadership Quarterly	Uhl-bien, M. ; Marion, R.	154	6.04
13	Servant Leadership And Serving Culture: Influence On Individual And Unit Performance	Academy of Management Journal	Liden, R. C. ; Wayne, S. J. ; Liao, C. ; Meuser, J. D.	145	11.63
14	When Does Benevolent Leadership Lead To Creativity? The Moderating Role Of Creative Role Identity And Job Autonomy	Journal of Organizational Behavior	Wang, A. ; Cheng, B.	128	4.86
15	A Social Identity Perspective On Leadership And Employee Creativity	Journal of Organizational Behavior	Hirst, G. ; Vandick, R. ; Vanknippenberg, D.	122	3.49
16	Transformational Leadership And Follower Creativity: The Moderating Effects Of Identification With Leader And Organizational Climate	Human Relations	Wang, P. ; Rode, J. C.	118	6.35
17	Leadership, Creative Problem-solving Capacity, And Creative Performance: The Importance Of Knowledge Sharing	Human Resource Management	Carmeli, A. ; Gelbard, R. ; Reiter-Palmon, R.	95	5.88
18	Leadership Behaviors And Group Creativity In Chinese Organizations: The Role Of Group Processes	The Leadership Quarterly	Zhang, A. Y. ; Tsui, A. S. ; Wang, D. X.	94	3.61
19	Contextual Inhibitors Of Employee Creativity In Organizations: The Insulating Role Of Creative Ability	Group and Organization Management	Choi, J. N. ; Anderson, T. A. ; Veillette, A.	87	2.28
20	Empowerment And Creativity: A Cross-level Investigation	The Leadership Quarterly	Sun, L. ; Zhang, Z. ; Qi, J. ; Chen, Z. X.	81	5.90

Notes. Citation ranking (113 final sample papers) and Scopus Field-Weighted Citation Impact (FWCI). Citations consider the sum of annual citations from 2009 to 2018.

Table 3
Results from the Top Journals, Authors and Countries

	Leadership, Innovation, Creativity (Set 3)			Top 27 (Set 5)		
	Journals	Authors	Countries	Journals	Authors	Countries
1	Leadership and Organization Development Journal	Denning, S.	USA	The Leadership Quartely	Mumford, M. D.	USA
2	Journal of Business Research	Kantabutra, S.	UK	Journal of Applied Psychology	Jansen, J. J. P.	China
3	Journal of Leadership Studies	Carmeli, A.	Australia	Journal of Leadership and Organizational Studies	Wang, P.	Australia
4	Strategy and Leadership	Daly, A.J.	China	Journal of Organizational Behavior	Carmeli, A.	Netherlands
5	The Leadership Quartely	Mumford, M. D.	Canada	Journal of Occupational and Organizational Psychology	Zhou, J.	Germany
6	Sustainability Switzerland	Bleich, M. R.	Netherlands	Journal of Managerial Psychology	-	Hong Kong
7	Journal of Product Innovation Management	Boerner, S.	Germany	Academy of Management Journal	-	Taiwan
8	Research Technology Management	Dhar, R.L.	India	Group and Organization Management	-	Canada
9	Academic Medicine	Dovey, K.	Spain	Human Resource Management	-	UK
10	Journal of Higher Education Policy and Management	Gu, J.	South Korea	Human Relations	-	Israel

Notes. Top 10 ranking of the highest volume of publications, by journals, authors, and country affiliation (corresponding authors) for the overall leadership and innovation/creativity research (set 3) and for the top 27 leadership and innovation/creativity journals (set 5). Considering set 5 (113 final sample papers), we could not present the ranking of authors from sixth place onward because there are several authors with the same number of publications. Thus, the presentation of any name in isolation would be unfair.

4.2 Dependent variables

Despite their different theoretical approaches, the studies in the top 20 journals sample have an interesting peculiarity to note. The vast majority of these works focus on employee creativity as a dependent variable across the following main leadership styles: empowering, transformational, abusive, and servant leadership. Innovation as a dependent variable is only addressed in the work of Crossan and Apaydin (2010) through their systematic review and in that of Vaccaro, Jansen, van den Bosch, and Volberda (2012), who suggest the moderating role of the size of the organization.

Overall, the findings in terms of the focus of the dependent variables are well distributed between innovation or creativity or both. Relevant variations were found when compared to other systematic literature reviews covering approximately the same period. According to Hughes et al. (2018), in a sample of 195 articles, 32% of publications considered innovation as a dependent variable, 47% focused on creativity, and 21% covered both. In our more focused sample (N = 113), we found that innovation accounted for 42.5% of the articles, 43.4% focused on creativity, and 14.1% covered both. It can be noted that despite the growth of work on innovation, the focus is still on creativity. The following arguments can be inferred from this. First, most of the knowledge developed so far focuses on creativity, therefore only providing insights on the impact of leadership on the process of generating original and useful ideas. Second, there are a number of easily accessible scales to measure creativity, which may explain why researchers have more often focused on creativity than on innovation.

Perhaps the slight growth observed in the work on innovation is explained by the wide range of definitions that innovation presents, as well as by the real practical need that its results offer. However, despite the calls issued by Hughes et al. (2018) and Rank et al. (2004), no relevant research has captured the subtle differences between creativity and innovation. As Anderson et al. (2014, p. 1299) highlight, creativity and innovation are related, but "they are by no means identical."

4.3 Leadership perspectives

We also sought to analyze the key leadership theories and perspectives that have been examined as predictors of creativity and innovation. Among the main leadership perspectives identified in the papers (N = 78), transformational leadership was predominantly found in 44% of the studies, 10% focused on empowering leadership, thus ranking second, 8% focused on LMX, 6% on transactional leadership, benevolent leadership emerged in 5% of the studies, and servant leadership appeared in only two works (3%). Other systematic reviews of the literature covering approximately the same period do not show any relevant variation, except for the emergence of benevolent leadership (Gumusluoglu, Karakitapoğlu-Aygün, & Scandura, 2017; Lu, Li, Leung, Savani, & Morris, 2018; Wang, Rode, Shi, Luo, & Chen, 2013; Wang, Xue, & Su, 2010). This development can be correlated with growth of the topic of leadership and research in innovation and creativity in Eastern countries (e.g., Table 3), where the aforementioned theory has been studied the most for cultural reasons.

Other leadership theories also emerged in the works on creativity-innovation: e.g., implicit leadership (Offermann & Coats, 2018); inclusive leadership (Randel et al., 2018); charismatic, ideological, or pragmatic (CIP) leadership (Griffith et al., 2018); leader-team exchange – (LTE) (Friedrich, Griffith, & Mumford, 2016); aversive leadership (Choi, Anderson, & Veillette, 2009); leader heuristic transfer (LHT) (McMahon & Ford, 2013); boundary-spanning leadership (BSL) (Salem, Van Quaquebeke, & Besiou, 2018); and temporal leadership (Chen & Nadkarni, 2017).

The strength, diversity, and expansion of the research with new leadership variables as antecedents of creativity and innovation are clear. It can be inferred that there is a growing interest in empowering and LMX leadership, but little interest in authentic (only two papers, accounting for 0.8%) and shared leadership (one paper) when it comes to creativity and innovation. From the observation of correlations between the leadership variables and outcomes, the leadership theories (e.g. transformational, empowering, and LMX) seem to be associated with creativity and innovation, but there is also high variability in the strength of the effects observed. Furthermore, we still do not know enough about the relative importance of these different leader behaviors or their combined effects on results.

4.4 Studies design

Other characteristics analyzed among the articles were their study design, their methodological approach, and their unit of analysis. This section has been divided

into two parts to focus on empirical and theoretical (including reviews and meta-analyses) works separately. First, Table 4 presents a synthesis of the empirical works. Later, Table 5 presents the theoretical studies, narrative literature reviews, and meta-analyses.

Leadership capable of producing creativity and innovation requires a demonstration that leaders can directly or indirectly influence their teams and organizations; that is, that the leader's behavior can influence innovation-creativity directly or through some mediation mechanisms, which we will evaluate shortly. However, after a detailed analysis of the literature, it was observed that the desired cause-effect relationship that would explain the phenomenon is absent in most studies. Almost half the articles in our sample (48%, N = 54) applied cross-sectional designs in which all the study variables were measured at the same time, emphasizing the overall challenges faced in leadership research. As pointed out by Hughes et al. (2018), the typical cross-sectional design in creativity-innovation leadership studies likely yields biased estimates of causal effects. Cross-sectional designs are not able to provide robust estimates of causal effects due to endogeneity bias (see details in Antonakis et al., 2010; Antonakis et al., 2014; Fischer et al., 2017; Hamilton & Nickerson, 2003). Endogeneity occurs when parameter estimates for the effect between two variables cannot be interpreted due to biases caused by simultaneity, common method effects, or omitted variables, among others. Biased results can yield incorrect conclusions about the veracity of the relationships under scrutiny.

Antonakis et al. (2010, 2014) and Fischer et al. (2017) argue that in order to foster knowledge development in leadership research, endogeneity bias should be addressed and meaningful estimates of casual relationships provided through experimental approaches and the use of instrumental variables. Instrumental variables are exogenous predictors that influence but are not influenced by an endogenous predictive model (Antonakis et al., 2010). Authors such as Hughes et al. (2018) strongly advocate the use of instrumental variables when examining causal process models in cross-sectional or longitudinal field studies. Unfortunately, in our study, no articles were found that use instrumental variables, which suggests a certain lack of awareness or indifference regarding best practices in the field.

Only five articles were found that used experimental approaches, which is a very modest amount, showing an opportunity for future research. However, another problematic observation is that in all five papers, the experiments rely on student samples (see Table 4). Thus, the present knowledge based on experiments leaves the issue open to the criticism that the experimental designs do not realistically simulate organizational configurations (Hauser, Linos, & Rogers, 2017), therefore reducing their external validity. Experiments published in the organizational literature have often been criticized for using student samples, unrealistic tasks, and for not reflecting realistic leader-follower interactions (Baumeister, Vohs, & Funder, 2007).

Table 5 presents the non-empirical works, among which we highlight the literature reviews and meta-analyses, which we further analyzed in detail.

The complex yet inconsistent association between leadership and innovation was discussed by Rosing, Frese, and Bausch (2011). The authors propose the theory of ambidextrous leadership as an antecedent of innovation. This specifies two complementary sets of leadership behavior that promote exploration and exploitation in individuals and teams needed to address the ever-changing requirements of the innovation process.

Hoffman, Woehr, Mal dagen-Young-john, and Lyons (2011) showed results that indicate that both trait-like (e.g. creativity and charisma) and state-like (e.g. problem-solving skills and decision making) individual differences were consistent predictors of effective leadership. General support was also observed for social and psychological processes by which transformational leaders promote employee job performance, including through mechanisms such as innovative behavior (Ng, 2017).

Recently, Lee, Willis, and Tians (2018) observed positive effects of entrepreneurial leadership on employee and team creativity. In addition, this study revealed the incremental contribution of entrepreneurial leadership to the effects of transformational leadership and LMX.

In another meta-analysis, Ng and Feldman (2012) examined the relationships between both personal characteristics and contextual factors and measures of creativity using self-assessment and evaluations from other observers (e.g. peers, superiors, and subordinates). The results suggest that effect sizes are larger when self-assessments are used.

Varied perspectives on creativity-innovation were identified in the works categorized as reviews. For example, innovation was examined as a process based on its results and on measures of its determinants (Crossan & Apaydin, 2010), as well as cultural differences that impact

Table 4
Synthesis of Empirical Works

Study Design	Unit of Analysis	Leaders	Authors
Cross-Sectional	Individual	Senior Leaders	Matzler, K., Bauer, F. A., & Mooradian, T. A. (2015); Rogelberg, S. G., Justice, L., Braddy, P. W., Paustian-Underdahl, S. C., Heggestad, E., Shanock, L., … Fleenor, J. W. (2013)
		Managers	Amundsen, S., & Martinsen, Ø. L. (2015); Carmeli, A., Gelbard, R., & Reiter-Palmon, R. (2013); Gupta, V., & Singh, S. (2015); Hirst, G., van Dick, R., & van Knippenberg, D. (2009); Hon, A. H. Y., Bloom, M., & Crant, J. M. (2014); Liden, R. C., Wayne, S. J., Liao, C., & Meuser, J. D. (2014); Michaelis, B., Stegmaier, R., & Sonntag, K. (2010); Pundt, A. (2015); Salem, M., Van Quaquebeke, N., & Besiou, M. (2018); Tse, H. H. M., To, M. L., & Chiu, W. C. K. (2018); Yi, H., Hao, P., Yang, B., & Liu, W. (2017)
		Supervisors	Choi, J. N., Anderson, T. A., & Veillette, A. (2009); Dong, Y., Liao, H., Chuang, A., Zhou, J., & Campbell, E. M. (2015); Lin, B., Mainemelis, C., & Kark, R. (2016); Madrid, H. P., Totterdell, P., Niven, K., & Barros, E. (2016); McMahon, S. R., & Ford, C. M. (2013); Qu, R., Janssen, O., & Shi, K. (2015); Rank, J., Nelson, N. E., Allen, T. D., & Xu, X. (2009); Wang, A. C., Chiang, J. T. J., Tsai, C. Y., Lin, T. T., & Cheng, B. S. (2013); Wang, A., & Cheng, B. (2010); Zhang, X., & Bartol, K. M. (2010); Zhang, Y., LePine, J. A., Buckman, B. R., & Wei, F. (2014)
		Students	Unsworth, K. L., & Mason, C. M. (2016)
	Multilevel	CEO	Peng, A. C., Lin, H. E., Schaubroeck, J., McDonough, E. F., Hu, B., & Zhang, A. (2016)
		Managers	Charbonnier-Voirin, A., El Akremi, A., & Vandenberghe, C. (2010); Do, H., Budhwar, P. S., & Patel, C. (2018); Gumusluoglu, L., Karakitapoğlu-Aygün, Z., & Scandura, T. A. (2017); Wang, P., Rode, J. C., Shi, K., Luo, Z., & Chen, W. (2013)
		Supervisors	Chen, A. S. Y., & Hou, Y. H. (2016); Dong, Y., Bartol, K. M., Zhang, Z.-X., & Li, C. (2017); Koseoglu, G., Liu, Y., & Shalley, C. E. (2017); Li, F., Yu, K. F., Yang, J., Qi, Z., & Fu, J. H. ying. (2014); Shin, S. J., Kim, T. Y., Lee, J. Y., & Bian, L. (2012); Sun, L., Zhang, Z., Qi, J., & Xiong, Z. (2012); Venkataramani, V., Richter, A. W., & Clarke, R. (2014); Wang, P., & Zhu, W. (2015); Wang, P., Rode, J. C., & Wang, P. (2010); Zhou, Q. I. N., Hirst, G., & Shipton, H. (2011)
		Students	Li, V., Mitchell, R., & Boyle, B. (2016)
	Organizational	CEO	Carmeli, A., Gelbard, R., & Gefen, D. (2010)
		Senior Leaders	Jansen, J. J. P., Vera, D., & Crossan, M. (2009); Vaccaro, I. G., Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2012); Wang, F., Yin, H., & Zhou, Z. (2012)
		Managers	Gelfand, M. J., Leslie, L. M., Keller, K., & de Dreu, C. (2012); Osborn, R. N., & Marion, R. (2009)
	Team	Managers	Jiang, Y., & Chen, C. C. (2018); Lisak, A., Erez, M., Sui, Y., & Lee, C. (2016); Yan, A., Tsui, A. S., & Xu, D. (2011)
		Supervisors	Mitchell, R., Parker, V., Giles, M., Joyce, P., & Chiang, V. (2012); Schuh, S. C., Zhang, X. A., Morgeson, F. P., Tian, P., & van Dick, R. (2018); Zacher, H., & Wilden, R. G. (2014)
Cross-Sectional Quali & Quanti	Individual	Supervisors	Lewis, M. W., Keller, J., Smith, W. K., Ingram, A., & Miron-Spektor, E. (2018)
Study Design	**Unit of Analysis**	**Leaders**	**Authors**
Experimental	Individual	Students	Griffith, J. A., Gibson, C., Medeiros, K., MacDougall, A., Hardy, J., & Mumford, M. D. (2018); Vessey, W. B., Barrett, J., & Mumford, M. D. (2011); Visser, V. A., van Knippenberg, D., van Kleef, G. A., & Wisse, B. (2013)
	Team	Students	Boies, K., Fiset, J., & Gill, H. (2015); Friedrich, T. L., Griffith, J. A., & Mumford, M. D. (2016)

Notes. Summary analysis of empirical works according to study design, unit of analysis, leaders, and respective authors (N=92)

Table 4
Continued...

Study Design	Unit of Analysis	Leaders	Authors
Longitudinal	Individual	Supervisor	Tierney, P., & Farmer, S. M. (2011)
		Students	Offermann, L. R., & Coats, M. R. (2018)
	Multilevel	Supervisor	Tafvelin, S., Armelius, K., & Westerberg, K. (2011)
		n/a	Sydow, J., Lerch, F., Huxham, C., & Hibbert, P. (2011)
	Organizational	CEO	Gupta, V. K., Han, S., Nanda, V., & Silveri, S. (Dino). (2018); Leih, S., & Teece, D. (2016); Makri, M., & Scandura, T. A. (2010)
		Senior Leaders	Knight, E., & Paroutis, S. (2017)
	Team	Supervisor	Kinnunen, U., Feldt, T., & Mauno, S. (2016)
Qualitative	Individual	CEO	Strubler, D. C., & Redekop, B. W. (2010)
		Scholars	Weber, J. M. (2012)
		n/a	Carroll, B. J., Parker, P., & Inkson, K. (2010)
	Organizational	Senior Leaders	Davis, J. P., & Eisenhardt, K. M. (2011); Seifried, C., & Katz, M. (2015)
Time-lagged	Individual	Managers	Harris, T. B., Li, N., Boswell, W. R., Zhang, X. A., & Xie, Z. (2014); Liu, D., Liao, H., & Loi, R. (2012); Naseer, S., Raja, U., Syed, F., Donia, M. B. L., & Darr, W. (2016)
		Supervisor	Gevers, J. & Demerouti, E. (2013); Gong, Y., Huang, J. C., & Farh, J. L. (2009); Zhang, S., Ke, X., Frank Wang, X. H., & Liu, J. (2018); Zhang, X., & Zhou, J. (2014)
	Multilevel	CEO	Chen, J., & Nadkarni, S. (2017)
		Managers	Gajendran, R. S., & Joshi, A. (2012)
		Supervisor	Chen, G., Farh, J. L., Campbell-Bush, E. M., Wu, Z., & Wu, X. (2013); Li, R., Wang, H., & Huang, M. (2018); Lu, L., Li, F., Leung, K., Savani, K., & Morris, M. W. (2018); Pan, J., Liu, S., Ma, B., & Qu, Z. (2018); Zhao, H. H., Seibert, S. E., Taylor, M. S., Lee, C., & Lam, W. (2016)
	Organizational	Senior Leaders	Shi, W., Pathak, S., Song, L. J., & Hoskisson, R. E. (2018)
	Team	Managers	Schaubroeck, J., Carmeli, A., Bhatia, S., & Paz, E. (2016)
		Supervisor	Hu, J., Erdogan, B., Jiang, K., Bauer, T. N., & Liu, S. (2018); Li, G., Liu, H., & Luo, Y. (2018)

Notes. Summary analysis of empirical works according to study design, unit of analysis, leaders, and respective authors (N=92)

Table 5
Non-empirical works

Theohretical	Individual	Senior Leaders	Hunter, S. T., Cushenbery, L. D., & Jayne, B. (2017)
		n/a	Maurer, T. J., & London, M. (2018); Randel, A. E., Galvin, B. M., Shore, L. M., Ehrhart, K. H., Chung, B. G., Dean, M. A., & Kedharnath, U. (2018)
	Team	n/a	Boni, A., Weingart, L., & Evenson, S. (2009); Gebert, D., Boerner, S., & Kearney, E. (2010)
	Organizational	CEO	Maak, T., Pless, N. M., & Voegtlin, C. (2016)
	Multilevel	n/a	Robledo, I. C., Peterson, D. R., & Mumford, M. D. (2012); To, M. L., Tse, H. H. M., & Ashkanasy, N. M. (2015); Uhl-Bien, M., & Marion, R. (2009)
Historimetric	Individual	CEO	Resick, C. J., Whitman, D. S., Weingarden, S. M., & Hiller, N. J. (2009)
	Organizational	n/a	Vessey, W. B., Barrett, J. D., Mumford, M. D., Johnson, G., & Litwiller, B. (2014)
Literature Review	Multilevel	n/a	Černe, M., Batistič, S., & Kenda, R. (2018); Crossan, M. M., & Apaydin, M. (2010); Hughes, D. J., Lee, A., Tian, A. W., Newman, A., & Legood, A. (2018)
	Organizational	n/a	Simsek, Z., Jansen, J. J. P., Minichilli, A., & Escriba-Esteve, A. (2015); Uhl-Bien, M., & Arena, M. (2018); Zhou, J., & Su, Y. (2010)
Meta-Analysis	Individual	n/a	Hoffman, B. J., Woehr, D. J., Maldagen-Youngjohn, R., & Lyons, B. D. (2011); Ng, T. W. H. (2017)
	Multilevel	n/a	Lee, A., Willis, S., & Tian, A. W. (2018); Rosing, K., Frese, M., & Bausch, A. (2011)
	n/a	n/a	Ng, T. W. H., & Feldman, D. C. (2012)

Notes. Summary analysis of theoretical works according to study design, unit of analysis, leaders, and respective authors (N=21).

it, thus distinguishing factors considered to be contextual (Zhou & Su, 2010). In addition, an integrative review was also identified that brings together theories on, for example, strategy, organizational innovation, networks, and complexity focused on organizational adaptability as an important result that enables the adaptive process through space as a critical form of leadership (Uhl-Bien & Arena, 2018).

In the theoretical works, several papers apply a large diversity of emerging leadership styles to the issue of innovation, showing less concentration than perspectives such as the transformational perspective.

At the senior leadership level, Hunter, Cushenbery, and Jayne (2017) challenged traditional leadership models by proposing that a dual leadership structure can serve as a potential solution to the challenges inherent to innovation. Also focusing on the upper echelons, Maak, Pless, and Voegtlin (2016) observed the influence on social innovation of a new integrative style in which the CEO tends to adopt responsible leadership and instrumental or integrative approaches based on moral obligations perceived in relation to shareholders or stakeholders.

At the team level, Boni, Weingart, and Evenson (2009) present an article on the effective commercialization of innovation through an academic program that combines entrepreneurial thinking, action and leadership, design thinking, and team building. Gebert, Boerner, and Kearney (2010) developed a general theory claiming that the combination of opposing action strategies promotes team innovation. They distinguished between open and closed strategies and posit that these are opposing but complementary in that each foster one of two processes necessary for team innovation: delegative leadership, which promotes knowledge generation, and directive leadership, which enhances knowledge integration. Also, To, Tse, and Ashkanasy (2015) observed that team creative processes unfolded from affection and transformational leadership.

Among the multilevel studies, Robledo, Peterson, and Mumford (2012) presented a creative leadership model of scientists and engineers based on Uhl-Bien and Marion's (2009) perspective that focuses on adaptive function, an interactive process involving adaptive leadership and complexity dynamics that generates emerging results such as innovation for the firm. Černe, Batistic, and Kenda (2018) offer propositions regarding the interactive influence of attachment styles that followers develop in their relationship with their leaders and HR systems on individual innovation processes. Finally, Maurer and London (2018) examine changing identity as an individual contributor to a leader within organizations that expect and reward innovation. They argue that changes in role identity range from incremental, through substantial, to radical

changes, which characterize a complete transformation to become a leader in behavior and identity.

4.5 Mediators & moderators

Tables 6A and 6B show the underlying mechanisms applied to explain how leadership perspectives focusing on different leader behaviors would influence creativity and innovation and the factors that may condition that association. All the mediators and moderators analyzed in each study were identified as well as the predominant leadership perspective covered by the researchers. Without intending to introduce a new taxonomy, the tables were consolidated by applying affinity clusters that take into consideration the following groups of mechanisms: contingencies, contextual and situational factors, power, identity, and cultural factors. The mediators and moderators were organized by the level of analysis considered, i.e. individual, team, organizational, or multilevel approaches.

The importance of the mediating and moderating variables in the theoretical model can be compared to the role of physical structural analysis in the construction of buildings, tunnels, and bridges. They entail the basis for the theoretical development and highlight practical implications regarding the topic at hand. Tables 6A and 6B show the wide range of mediators and moderators, some of which have conceptual similarities (for example, climate for innovation, climate of innovation working group, and climate of innovation) that were applied to discuss different perspectives of leadership, sometimes with an insufficient theoretical distinction about how these mechanisms affect followers' creative or innovative behavior.

For example, Charbonnier-Voirin, El Akremi, and Vandenberghe (2010) observed that a stronger climate of innovation would improve the association between transformational leadership and the individual's adaptive performance. Wang et al. (2013) showed that transformational leadership is also positively related to a group innovation climate and moderates the relationship between group demographic diversity and a group innovation climate. Chen and Hou (2016) observed an indirect effect of ethical leadership on individual creativity, which is stronger when employees work in a more innovative environment. While an innovation climate seems likely to play a role in the context of innovation, the specific direct or indirect impact of leader behaviors on innovation climates remains to be more carefully theorized and clarified.

Another issue that may compromise the knowledge thus far developed is the fact that many mediators identified in Tables 6A and 6B represent psychological states assessed through questionnaires, which may mean that the different measures share a strong estimative component (Van Knippenberg & Sitkin, 2013).

Considering the mediating mechanisms presented by Shin (2015), Zhou and Shalley (2011), and extended by Hughes et al. (2018), we can observe that motivational, cognitive, affective, relational, and identification processes were identified as means through which leadership could affect creativity and innovation. For instance, among the motivational mechanisms, intrinsic motivation seems particularly important for creativity-innovation since innovation processes require employees' actions to go beyond normal work tasks and for them to challenge accepted practices (McMahon & Ford, 2013). Not surprisingly, factors such as intrinsic motivation, psychological safety, and empowerment (Amundsen & Martinsen, 2015; Sun, Zhang, Qi, & Xiong, 2012; Yi, Hao, Yang, & Liu, 2017), as well as self-efficacy and collective efficacy (Chen, Farh, Campbell-Bush, Wu, & Wu, 2013; Gong, Huang, & Farh, 2009; Shin, Kim, Lee, & Bian, 2012; Tierney & Farmer 2011; Yan, Tsui, & Xu, 2011; Zhang & Zhou, 2014) were frequently examined by scholars. Hughes et al. (2018) warn that many of these mediators overlap conceptually and empirically, thus highlighting the still narrow understanding in the field as well as the need for integration.

Cognitive skills are also relevant for creative performance (Shin, 2015). Access to the development of these skills is often gained through the leader. This can happen through intellectual stimulation (Chen et al., 2013), facilitating engagement in creative processes (Reiter-Palmon & Illies, 2004; Shin, 2015), or by building and strengthening an organizational and innovation climate (Charbonnier-Voirin et al., 2010; Choi et al., 2009; Chen et al., 2013; Chen & Hou, 2016; Li, Liu & Luo, 2018; Michaelis, Stegmaier, & Sonntag, 2010; Pundt, 2015; Tafvelin, Armelius, & Westerberg, 2011; Wang et al., 2010; Wang et al., 2013) that inspires team members to share knowledge and ideas.

Although Amabile, Barsade, Mueller, and Staw (2005) highlighted that affect is an important antecedent of creativity and the literature offers a wide variety of perspectives that present explanatory mechanisms for this relationship, in our review we found few studies examining these mechanisms. For example, Ng (2017)

Table 6A
Summary Analysis of Mediators, Moderators, Leadership, and Respective Authors

Antecedent	Mediators	Moderators	Authors
Benevolent and Authoritarian		Leader Gender	Wang, A. C., Chiang, J. T. J., Tsai, C. Y., Lin, T. T., & Cheng, B. S. (2013)
Boundary-Spanning Leadership (BSL)	Collaboration		Salem, M., Van Quaquebeke, N., & Besiou, M. (2018)
Charismatic, Ideological or Pragmatic (CIP); Aversive	Close Monitoring	Leader Distance	Griffith, J. A., Gibson, C., Medeiros, K., MacDougall, A., Hardy, J., & Mumford, M. D. (2018); Choi, J. N., Anderson, T. A., & Veillette, A. (2009)
		Access to Resources; Access to Information	Zhang, S., Ke, X., Frank Wang, X. H., & Liu, J. (2018)
Empowering		Uncertainty Avoidance	Zhang, X., & Zhou, J. (2014)
	Creative Process Engagement; Role Clarity	Perceived Organizational Support	Harris, T. B., Li, N., Boswell, W. R., Zhang, X. A., & Xie, Z. (2014)
Empowering; Shared; Dual	Leader Role Conflict; Loss of Resources; Leader Stress; Strain	Team Status Conflict	Li, R., Wang, H., & Huang, M. (2018); Hunter, S. T., Cushenbery, L. D., & Jayne, B. (2017); Zhang, Y., LePine, J. A., Buckman, B. R., & Wei, F. (2014)
Ethical	Voice Behavior		Chen, A. S. Y., & Hou, Y. H. (2016)
Formal and Informal	Informal Leadership Status	Visionary Behavior	Pan, J., Liu, S., Ma, B., & Qu, Z. (2018)
		Intellectual Stimulation	Zhou, Q. I. N., Hirst, G., & Shipton, H. (2011)
Non-specific Leadership	Psychological Safety; Ability to Focus Attention; Psychological Empowerment		Yi, H., Hao, P., Yang, B., & Liu, W. (2017); Hu, J., Erdogan, B., Jiang, K., Bauer, T. N., & Liu, S. (2018); Zhang, X., & Bartol, K. M. (2010); Amundsen, S., & Martinsen, Ø. L. (2015)
		Bottom-up Governance	Wang, F., Yin, H., & Zhou, Z. (2012)
		Innovativeness; Market Competitiveness; Managerial Discretion	Gupta, V. K., Han, S., Nanda, V., & Silveri, S. (Dino). (2018)
Happy and Sad	Follower Happiness and Sadness		Visser, V. A., van Knippenberg, D., van Kleef, G. A., & Wisse, B. (2013)
Innovation	Strategic Fit		Carmeli, A., Gelbard, R., & Gefen, D. (2010)
Leader Social Network		Betweenness Centrality	Venkataramani, V., Richter, A. W., & Clarke, R. (2014)
Leader-coach (TLC)	Experimental Team Learning		Schaubroeck, J., Carmeli, A., Bhatia, S., & Paz, E. (2016)

Continue

Conclusion

Antecedent	Mediators	Moderators	Authors
	Leader Perceptions		Schuh, S. C., Zhang, X. A., Morgeson, F. P., Tian, P., & van Dick, R. (2018)
LMX		Human Resources Systems	Černe, M., Batistič, S., & Kenda, R. (2018)
	Member Influence on Team Decisions	Team Dispersion; Team Power Distance	Gajendran, R. S., & Joshi, A. (2012); Hu, J., Erdogan, B., Jiang, K., Bauer, T. N., & Liu, S. (2018)
Paradox	Experiencing Tensions	Paradox Mindset	Lewis, M. W., Keller, J., Smith, W. K., Ingram, A., & Miron-Spektor, E. (2018)
Servant	Conflict Culture; Serving Culture	Culture; Team Cultural Diversity	Zhou, J., & Su, Y. (2010); Lisak, A., Erez, M., Sui, Y., & Lee, C. (2016); Gelfand, M. J., Leslie, L. M., Keller, K., & de Dreu, C. (2012); Liden, R. C., Wayne, S. J., Liao, C., & Meuser, J. D. (2014)

Table 6A
Continued...

Antecedent	Mediators	Moderators	Authors
	Structural Empowerment; Psychological Empowerment		Sun, L., Zhang, Z., Qi, J., & Xiong, Z. (2012)
	Team Knowledge Sharing; Individual Skill Development	Team Knowledge Sharing	Dong, Y., Bartol, K. M., Zhang, Z.-X., & Li, C. (2017)
Transformational	Organization Changing; Commitment to Change		Zhao, H. H., Seibert, S. E., Taylor, M. S., Lee, C., & Lam, W. (2016); Michaelis, B., Stegmaier, R., & Sonntag, K. (2010)
	Abusive Supervision	Attributed Motives	Liu, D., Liao, H., & Loi, R. (2012)
		Task Interdependence	Li, V., Mitchell, R., & Boyle, B. (2016)
	Personal Control		Tse, H. H. M., To, M. L., & Chiu, W. C. K. (2018)

Table 6B
Summary Analysis of Mediators, Moderators, Leadership, and Respective Authors

Antecedent	Mediators	Moderators	Authors
Transformational and Authentic		Chinese Traditionality	Li, F., Yu, K. F., Yang, J., Qi, Z., & Fu, J. H. ying. (2014)
Transformational and Authoritarian	Team Information Sharing; Team Shared Goals; Knowledge Sharing		Hu, J., Erdogan, B., Jiang, K., Bauer, T. N., & Liu, S. (2018); Madrid, H. P., Totterdell, P., Niven, K., & Barros, E. (2016); Lisak, A., Erez, M., Sui, Y., & Lee, C. (2016); Jiang, Y., & Chen, C. C. (2018); Yan, A., Tsui, A. S., & Xu, D. (2011)
Transformational and Benevolent	Team Cooperative Norms; Within-Team Knowledge Sharing; Team Autonomy	Team Knowledge Acquisition; Job Autonomy	Jiang, Y., & Chen, C. C. (2018); Wang, A., & Cheng, B. (2010)
Transformational and Contextual		Leader Attention; Network Development	Osborn, R. N., & Marion, R. (2009)
Transformational; Charismatic; Empowering	Team Trust	Trust; Inspirational Motivation	Boies, K., Fiset, J., & Gill, H. (2015); Zhang, X., & Zhou, J. (2014); Hirst, G., van Dick, R., & van Knippenberg, D. (2009)
		Creative Requirement; Leader Creativity Expectations; Creative Personality; Perceived Organizational Support for Creativity; Creative and Analytical Task; Creative Ability	Pundt, A. (2015); Qu, R., Janssen, O., & Shi, K. (2015); Tse, H. H. M., To, M. L., & Chiu, W. C. K. (2018); Koseoglu, G., Liu, Y., & Shalley, C. E. (2017); Visser, V. A., van Knippenberg, D., van Kleef, G. A., & Wisse, B. (2013); Choi, J. N., Anderson, T. A., & Veillette, A. (2009)
Transformational and LMX			
	Affective; Motivational; Social Exchange		Ng, T. W. H. (2017)
Transformational and Transactional		Firm Performance; Industry Dynamism; Environmental Dynamism; Organizational Size	Peng, A. C., Lin, H. E., Schaubroeck, J., McDonough, E. F., Hu, B., & Zhang, A. (2016); Jansen, J. J. P., Vera, D., & Crossan, M. (2009); Vaccaro, I. G., Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2012)
	Organizational Justice; Justice Perception; Justice Enhancement		Zhang, Y., LePine, J. A., Buckman, B. R., & Wei, F. (2014); Gupta, V., & Singh, S. (2015); Ng, T. W. H. (2017)

Table 6B
Continued...

Antecedent	Mediators	Moderators	Authors
Transformational; Benevolent; Aversive; LMX; Ethical; Empowering	Innovation Workgroup Climate; Organizational Climate; Climate for Innovation; Feedback Seeking Climate	Climate for Innovation; Climate for Initiative; Innovative Climate	Charbonnier-Voirin, A., El Akremi, A., & Vandenberghe, C. (2010); Wang, P., Rode, J. C., Shi, K., Luo, Z., & Chen, W. (2013); Choi, J. N., Anderson, T. A., & Veillette, A. (2009); Michaelis, B., Stegmaier, R., & Sonntag, K. (2010); Chen, G., Farh, J. L., Campbell-Bush, E. M., Wu, Z., & Wu, X. (2013); Chen, A. S. Y., & Hou, Y. H. (2016); Pundt, A. (2015); Tafvelin, S., Armelius, K., & Westerberg, K. (2011); Li, R., Wang, H., & Huang, M. (2018); Wang, P., Rode, J. C., & Wang, P. (2010)
Transformational; Benevolent; LMX	Team Identification; Department Identification; Leader Identification	Leader Identification; Follower Relational Identification; Creative Role Identity	Gumusluoglu, L., Karakitapoğlu-Aygün, Z., & Scandura, T. A. (2017); Qu, R., Janssen, O., & Shi, K. (2015); Wang, P. & Rode, J. C. (2010); Ng, T. W. H. (2017); Wang, A., & Cheng, B. (2010); Koseoglu, G., Liu, Y., & Shalley, C. E. (2017)
Transformational; Benevolent; LMX; Leader-coach (TLC)	Communication Openness; Team Communication Inclusion	Team Leader Communication; Contentious Communication	Lu, L., Li, F., Leung, K., Savani, K., & Morris, M. W. (2018); Lisak, A., Erez, M., Sui, Y., & Lee, C. (2016); Gajendran, R. S., & Joshi, A. (2012); Schaubroeck, J., Carmeli, A., Bhatia, S., & Paz, E. (2016); Boies, K., Fiset, J., & Gill, H. (2015)
Transformational; Charismatic; Boundary-Spanning (BSL)		Team Prototypicality; In-group Prototypicality	Hirst, G., van Dick, R., & van Knippenberg, D. (2009); Salem, M., Van Quaquebeke, N., & Besiou, M. (2018)
Transformational; Empowering; Authoritarian	Self-efficacy; Collective efficacy	Self-efficacy	Shin, S. J., Kim, T. Y., Lee, J. Y., & Bian, L. (2012); Tierney, P., & Farmer, S. M. (2011); Gong, Y., Huang, J. C., & Farh, J. L. (2009); Zhang, X., & Zhou, J. (2014); Yan, A., Tsui, A. S., & Xu, D. (2011); Chen, G., Farh, J. L., Campbell-Bush, E. M., Wu, Z., & Wu, X. (2013)
Transformational; Empowering; Servant	Team Creative Identity; Employee Identification;	Empowerment Role Identity	Zhang, X., & Bartol, K. M. (2010); Wang, P., & Zhu, W. (2015); Mitchell, R., Parker, V., Giles, M., Joyce, P., & Chiang, V. (2012); Liden, R. C., Wayne, S. J., Liao, C., & Meuser, J. D. (2014);
Transformational; Leader Heuristic Transfer (LHT)	Intrinsic Motivation, Intellectual Stimulation		McMahon, S. R., & Ford, C. M. (2013); Chen, G., Farh, J. L., Campbell-Bush, E. M., Wu, Z., & Wu, X. (2013)
Transformational; Transactional; Empowering	Self-esteem; Self-leadership; Employee Self-perception	Organization-based Self-esteem, Self-presentation; Self-concordance Strategies	Zhang, S., Ke, X., Frank Wang, X. H., & Liu, J. (2018); Rank, J., Nelson, N. E., Allen, T. D., & Xu, X. (2009); Amundsen, S., & Martinsen, Ø. L. (2015); Unsworth, K. L., & Mason, C. M. (2016); Li, R., Wang, H., & Huang, M. (2018)

observes that affect influences the relationship between transformational leadership and innovative employee behavior, and Visser, van Knippenberg, van Kleef, and Wisse (2013) show that the effects of a leader's affective demonstrations on followers' creative performance are mediated by the follower's positive affect, indicating that emotional contagion somehow underlies these effects. The limited knowledge on affective mediators is surprising since there are theoretical grounds to expect that positive and negative affect can influence creativity and persistence (e.g., George & Zhou, 2002).

Overall, identification-based mediators continue to receive little attention (Hughes et al., 2018), though identification with the leader, team, and department has

been found to mediate the effects of transformational leadership, benevolent leadership, and LMX on creativity and innovation (Gumusluoglu et al., 2017; Koseoglu et al., 2017; Ng, 2017; Qu, Janssen, & Shi, 2015; Wang & Rode, 2010; Wang & Cheng, 2010).

According to the social exchange theory, the nature of the relationships between leaders and followers can lead to creativity/innovation because followers tend to reciprocate treatment or recognition from the leader by engaging in superior performance (e.g., Martin, Thomas, Guillaume, Lee, & Epitropaki, 2016). Social relationships include factors such as trusting the leader. We identified additional social mediators that directly or indirectly impact trust: team cooperative norms, within-team knowledge sharing, team information sharing, and shared team goals (Hu et al., 2018; Jiang & Chen, 2018; Lisak, Erez, Sui, & Lee, 2016; Madrid, Totterdell, Niven, & Barros, 2016; Yan et al., 2011). For example, Boies et al. (2015) provide evidence that transformational leadership influences the outcomes of team creativity through trust in teammates. In the same vein, Lee et al. (2018) suggest that trust in the leader mediates the association between transformational factors and leadership empowerment in creativity.

Looking at the moderators, we note that their wide variety makes it difficult to summarize them, and while the magnitude of the L-C/I relationship is large, the approach to exploring moderation tends to use idiosyncratic, micro-theoretical, and study-specific reasoning.

The moderators identified can be categorized as follower attributes such as personality, motivation, trust, inspiration (Boies, Fiset, & Gill, 2015; Hirst, 2009; Zhang & Zhou 2014), self-esteem, self-presentation, self-concordance (Amundsen & Martinsen, 2015; Li et al., 2018; Rank et al., 2004; Unsworth & Mason, 2016; Zhang, Ke, Frank Wang, & Liu, 2018), leader attributes such as gender (Wang et al., 2013), creative ability (Choi et al., 2009), leader attention (Osborn & Marion, 2009), empowerment (Dong, Liao, Chuang, Zhou, & Campbell, 2015), visionary behavior (Pan, Liu, Ma, & Qu, 2018), leader distance (Griffith et al., 2018; Choi et al., 2009), the leader-follower relationship such as LMX and identification with the leader (Gumusluoglu et al., 2017; Koseoglu et al., 2017; Ng, 2017; Qu et al., 2015; Wang & Rode 2010; Wang & Cheng, 2010), or aspects of the organizational or team context such as the organizational structure and team relational conflict (Li et al., 2018; Hunter et al., 2017; Zhang, LePine, Buckman, & Wei, 2014), team knowledge sharing (Dong, Bartol, Chang, & Li, 2017), team cultural diversity (Gelfand, Leslie, Keller, & de Dreu, 2012; Liden, Wayne, Liao, & Meuser, 2014; Lisak et al., 2016; Zhou & Su, 2010), firm performance, industry dynamism, environmental dynamism, organizational size (Jansen, Vera, & Crossan, 2009; Peng et al., 2016; Vaccaro et al., 2012), and a climate for innovation (Charbonnier-Voirin et al., 2010; Chen et al., 2013; Chen & Hou, 2016; Choi et al., 2009; Li et al., 2018; Michaelis et al., 2010; Pundt, 2015; Tafvelin et al., 2011; Wang et al., 2010; Wang et al., 2013). In general, the set of moderators lacks a coherent theoretical narrative.

To conclude, we also highlight that some papers (N = 19, 22%) considered leadership as the mediator or moderator in their research design. Also presented are the key variables with an effect on creativity-innovation, intermediate leadership, or whose effect it changes. See Tables 7A and 7B below:

5 Conclusion, Future Research, and Limitations

Although the United States still leads as the main supplier of research in the field, there has been accelerated growth in the participation of Eastern countries in the production of knowledge on the effects of leadership on creativity/innovation. The *Leadership Quarterly* and *Leadership and Organization Development Journal* are the leading journals that focus on leadership as an antecedent of C/I in business administration and management. There has also been an accelerated growth of research on L-C/I when compared to overall studies in the leadership field. That trend most likely derives from the belief that innovation and creativity are considered increasingly important to promote organizational performance, success, and the long-term survival of companies (Anderson et al., 2014).

Nevertheless, most studies are about the effects of leadership on creativity, while its effects on innovation still remain to be better understood. Notwithstanding, leadership may be one of the main drivers of organizational innovation, given leaders' ability to encourage creative thinking and to establish an innovation-supporting organizational climate.

Different leadership styles seem to have a positive impact on organizational innovation. Some styles have a

Table 7A
Summary of Leadership Perspectives in terms of Moderators, Key Variables, and Respective Authors

Moderators	Key Variables	Authors
Transformational	Cognitive team diversity, individual team member creativity, and commitment to the changing organization	Shin et al., 2012; Zhao et al., 2016
Transformational and Transactional	Organizational justice, work stressors, and job performance (creativity)	Zhang et al., 2014
LMX	Leader perceptions of innovative employee efforts, employee job performance, organizational citizenship behaviors (OCBs), and creativity	Schuh et al., 2018; Naseer et al., 2016
Operational	Innovation quantity, innovation resonance, and novelty	Makri & Scandura, 2010
Empowering	Customer behaviors, self-leadership, psychological empowerment, and resistance to change and creativity	Dong et al., 2015; Amundsen et al., 2015; Hon et al., 2014
Benevolent	Intercultural communication openness, information elaboration	Lu et al., 2018
Shared	Leader role conflict, loss of resources, leader stress and strain	Hunter et al., 2017

Table 7B
Summary of Leadership Perspectives in terms of Mediators, Key Variables, and Respective Authors

Moderators	Key Variables	Authors
Transformational	Self-esteem, innovation success	Matzler, Bauer & Mooradian, 2015
Responsible	Leader orientation and social innovation	Maak et al., 2016
Complexity - CLT	Adaptive leadership and complexity dynamics	Uhl-Bien & Marion, 2009
Directive and Participative	Assessment orientation toward team efficiency and creativity	Li et al., 2018
Inclusive	Individual difference factors and member behavior outcomes	Randel et al., 2018
Temporal	Temporal dispositions and entrepreneurship - firm's innovation	Chen & Nadkarmi, 2017
Servant	Employee creativity, firm-level innovation and serving culture, employee identification	Do et al., 2018; Liden et al., 2014

direct impact on organizational innovation and the impact of others is indirect through several mediating variables. Transformational leadership is the leading perspective applied in investigations about creativity/innovation, accounting for 44% of the papers published. Overall, the influence of transformational leadership on innovation has been related to both exploratory and exploitative innovation activities. Transactional leadership, which is a more benefits- and objectives-based leadership style, also seems to have a positive impact on organizational innovation, but does not seem to be as strong a factor as transformational leadership, with its impact limited to exploitative innovation activities. Like transformational leaders, charismatic leaders who can build trust and gain their followers' respect appear to be more likely to influence followers' innovative behaviors.

Positive forms of leadership also seem to offer a promising venue for research on the connection. Ethical leaders who act as role models for their followers and provide them with an equal opportunity to voice their opinions seem to foster organizational learning and innovation. By allowing followers to participate in decision-making processes, participative leadership can unlock exploratory innovation activities. Benevolent leadership also positively influences exploitative innovation. Authentic leader behaviors, which are value-driven and oriented toward others, were also found to enhance an innovation climate at the organizational and group levels. Humble leaders who appreciate their followers' contributions and admit their own mistakes and limitations have also been found to positively influence organizational learning and innovative behaviors.

Taken together, these findings appear to signal that several nuanced and somewhat complementary leader behaviors are necessary to foster innovation. Ambidextrous leadership is a complex and compelling leadership style that offers promise for application as an overarching perspective. Ambidextrous leaders combine diverging and converging behaviors, which seem to enhance team

innovation and to determine the organizational climate. Transformational leadership has been positively related to innovation ambidexterity, particularly in the case of radical innovation, which reinforces the aforementioned conclusion.

Finally, distributed and shared leadership styles are based on the idea that all organizational members should practice leadership roles, not only those in positions of authority. These frameworks focus on knowledge sharing, which is an important element that drives organizational innovation ambidexterity. This calls attention to the role of empowering leadership as another promising venue to be further investigated in future research. In addition, entrepreneurial leadership seems to result in the exploitation of business opportunities and to facilitate the implementation of innovation processes.

As far as design and methodology are concerned, most studies are still cross-sectional, with no publications applying instrumental variables to avoid endogeneity bias. The few experiments in the field have relied on student samples, reinforcing criticisms that the knowledge in the field is based on contexts that do not simulate the organizational reality.

Based on these findings, clear paths for the development of future research on the topic can be highlighted:

a) Studies should integrate leadership perspectives to test their combined or additive effects as well as their relative relevance, therefore promoting theoretical evolution in the field.

b) Studies should also expand the theorization on the topic, exploring and deepening the knowledge about the mechanisms through which leadership affects creativity and innovation as two distinct outcomes in the business context.

c) Studies should explore the connections between entrepreneurship, entrepreneurial leadership, and creativity/innovation in the context of start-ups and technological disruption.

d) Researchers are invited to mitigate problems with measurement and design by including instrumental variables in cross-sectional projects and applying experimental designs when possible to establish a reliable foundation to support unfolding practical applications.

e) More studies should be based on field experiments with professional participants, seeking to establish well-founded causal relationships while increasing external validity.

f) Longitudinal studies should verify if different leadership frameworks are more or less relevant throughout the innovation process cycle as it develops over time.

g) Studies should also propose models for the connection between leadership and creativity and innovation across different industries and cultures, exploring the inherent tensions that exist between the various types of innovation outcomes and their underlying processes (e.g., industry innovation vs. social innovation).

This study has some limitations that we should point out. The first limitation concerns the sample and filter criteria. Our analysis is based on data gathered from one database. Although it is a highly recognized depository of publications in the field, the database may have omitted relevant publications or issues. In addition, the filtering criteria employed may also have missed relevant research.

In this study, our focus was on analyzing the latest knowledge on the application of leadership theories to address creativity and innovation in management and business administration. Therefore, we applied the "top 27" journals criterion, based on the highest impact factors in the fields of management and business administration (Fischer et al., 2017). However, these journals are not the only ones that publish research on creativity and innovation. While we scrutinized the leading journals with such a focus and found very few studies that have addressed leadership as an interpersonal phenomenon in the last decade, we may have left out publications with a focus on L-C/I published in other journals.

Future analyses could include a comprehensive search in non-indexed journals, proceedings, theses, and books so that a broader perspective of the research production on the topic can be provided. According to Marques, Reis, and Gomes (2018, p. 21), disruptive ideas might also come from unusual sources such as master's or doctoral work, "which also often never leaves the desks of its authors." Additionally, studies published in languages other than English were also not considered here. It is important to explore leadership variables investigated in studies published in other languages and developed in

other cultures as it is reasonable to suppose that knowledge on L-C/I can be developed everywhere.

Creativity and innovation are a prominent concern in organizations of all types. However, we found that the research stream on the L-C/I intersection is relatively immature. Several constraints that pertain to research on each phenomenon entail boundaries to that endeavor. On one hand, Antonakis and Day (2017) warn us that understanding leadership research is a daunting task, due to the quantity and wealth of frameworks and research production – this in itself poses challenges to integrating the knowledge on how leadership affects human behavior and collective efforts. One the other hand, Crossan and Apaydin (2010) also signal that the fragmentation of research into creativity and innovation is another major challenge that is still to be overcome.

Our observations support previous research in this area and build upon prior recommendations. In this sense, in addition to showing the current stage of the research on L-C/I, we also highlight that the topic presents many opportunities for researchers. New theoretical and empirical efforts to understand the connections between leadership and creativity/innovation can even foster theory integration in the leadership field and metatheoretical development in the innovation field, therefore contributing to enriching the existing body of research in the fields of leadership and innovation in their own right. Such efforts are needed to bring momentum to the research on their connection in the next ten years, generating new, actionable knowledge to nourish leadership and boost superior innovation.

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Supplementary Material
Supplementary material accompanies this paper.

Appendix A - References used as the object of this review (113 papers)
This material is available as part of the online article from https://www.scielo.br/j/rbgn