Online ISSN: 1521-4672 Print ISSN: 1547-9684

Informing Science: the international journal of an emerging transdiscipline

Volume No. 28
Issue No. 3
Sep - Dec 2025

ENRICHED PUBLICATIONS PVT. LTD

S-9, IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR-5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-47026006

Online ISSN: 1521-4672 Print ISSN: 1547-9684

Informing Science: The International Journal of an Emerging Transdiscipline

What is the transdiscipline of Informing Science?

What is Informing Science: here is an hour long video introduction by Prof. T. Grandon Gill, presented at InSITE 2011 in Novi Saad, Serbia, and two books that are available online for free viewing and downloading of their PDFs:

- Informing Science Volume One: Concepts and Systems, and
- Informing Science Volume Two: Design and Research Issues

.

Lastly, in 2009 I wrote the paper A Philosophy of Informing Science.

What is the journal Informing Science?

The journal Informing Science: the international journal of an emerging transdiscipline especially welcomes papers that bring together and cross the research heritage and epistemologies on finding better ways to inform from diverse fields including technology, psychology, brain science, information science, and other diverse disciplines and the application of these ways to finding better ways to inform to client disciplines such as health care, government, and education. The journal welcomes conceptual, theoretical and empirical contributions. The ideal paper builds on existing research not only in the author's own discipline but also from the transdiscipline of Informing Science.

All submissions and reviewing is done online using the Informing Science Institute Paper Review System. Manuscripts are submitted online and reviewed electronically using our article submission management system. For this reason, all authors and co-authors need to obtain an ISI colleague account, available at http://Join.InformingScience.org .

We provide our published authors with both a quality print publication and the widespread readership that comes from publishing all articles online within a few weeks of acceptance. This approach ensures that published works are read and cited by the widest possible audience.

Mission

Informing Science: the International Journal of an Emerging Transdiscipline is the principal channel for sharing knowledge about and encouraging interest in informing across a diverse body of researchers drawn from many disciplines and nations.

The academically peer refereed journal Informing Science endeavors to provide an understanding of the complexities in informing clientele. Fields from information systems, library science, journalism in all its forms to education all contribute to this science. These fields, which developed independently and have been researched in separate disciplines, are evolving to form a new transdiscipline, Informing Science.

Informing Science publishes articles that provide insights into the nature, function and design of systems that inform clients. Authors may use epistemologies from engineering, computer science, education, psychology, business, anthropology, and such. The ideal paper will serve to inform fellow researchers, perhaps from other fields, of contributions to this area.

Online ISSN: 1521-4672 Print ISSN: 1547-9684

Editors in Chief

Online ISSN: 1521-4672 Print ISSN: 1547-9684

Informing Science: The International Journal of an Emerging Transdiscipline

(Volume No. 28, Issue No. 3, Sep - Dec 2025)

Contents

Online ISSN: 1521-4672 Print ISSN: 1547-9684

THE TRANSLATIONAL LEARNING ECOSYSTEM

Gaetano R. Lotrecchiano*
George Washington University, Washington, DC, USA
Marie Norman
University of Pittsburgh, Pittsburgh, PA, USA

ABSTRACT

Aim/Purpose In this paper we propose an ecosystem for translational learning that combines core learning principles with a multilevel construct that embraces the tenets of translational research, namely, teaming, translating, and implementing. The goal of the paper is to argue that knowledge of learning sciences is essential at individual, team, and organizational levels in the translational science enterprise.

Background The two decades that we can now call the translational era of health and medicine have not been without challenges. Many inroads have been made in navigating how scientific teaming, translating knowledge across the health spectrum, and implementing change to our health systems, policies, and interventions can serve our changing global environment. These changes to the traditional health science enterprise require new ways of understanding knowledge, forging relationships, and managing this new tradition of science. Competency requirements that have become important to the enterprise are dependent on a deep understanding about how people learn as individuals, in teams, and within organizations and systems.

Methodology An individual, team, and organizational conceptual framework for learning in translational ecosystems is developed drawing on the learning science literature, a synthesis of 9 key learning principles and integrated with core competencies for translational science.

Contribution / Findings The translational learning ecosystem is a means by which to understand how translational science competencies can be reinforced by core learning principles as teaming, translating, and implementation intersect as part of the translational
science enterprise.

Recommendations for Practitioners This paper connects learning science to tailored principles in a simplified way so that those working translational science with less knowledge of theories of learning and pedagogy may be able to access it in a clear and concise way.

Recommendations for Researchers This paper provides a framework for researchers who engage in the education of translational scientists as well as those who are charged with training new scientists in an emerging field critical to health and medicine.

Impact on Society This paper allows for greater inclusion of learning science as a critical aspect of the sciences that seek to help move discovery and research to policy and social impact.

Future Research The translational ecosystem described can serve to expand how teaching and learning impact scientific advances. In addition, it serves as a means in which to understand the impact of learning

on micro, meso, and macro levels.

Keywords ecosystem, pedagogy, team science, implementation, translation, learning science

INTRODUCTION

Translational science grew out of the realization that important bench research was not efficiently making its way into clinical practice and thus not improving the health of individuals and populations as it could and should (Austin, 2018; Zerhouni, 2003). Scholars have commented on the fact that improving the translation process has proven far more complicated than initially conceived because, as Braithwaite et al. (2018) point out, "The health system is probabilistic and stochastic, not deterministic and causal" and depends at all stages on human systems distinguished by uncertainty, illogic, and unpredictability (p. 3). Translational research, thus, is a tricky enterprise, requiring the best and most nuanced science, conducted by interdisciplinary teams skilled at navigating complexity, engaging diverse perspectives, and thinking outside the box. Conducting and supporting such nuanced, boundary-defying research and application for downstream impact requires that those dedicated to clinical and translational science work where scientific exploration is accompanied by lifelong learning. This is where the learning sciences can significantly advance the success of discovery, application, and dissemination (Norman & Lotrecchiano, 2021).

Translational science requires a deep knowledge of how people, whether individually or in teams and organizations, learn and potentially change as they learn, unlearn, and relearn the traditional research enterprise (B. F. Jones et al., 2008; Wuchty et al., 2007). Decades of research on the mechanisms and conditions that promote deep, flexible, and effective learning have not made their way to the forefront of the translational science movement. Instead, discussions about learning are often circumscribed, delegated primarily to the context of classroom teaching and training with little regard for the flexible and agile skills necessary to operate within the "the new youngest science, with boundless promise to transform science and medicine" (Austin, 2018, p. 456). We believe, however, that an understanding of the learning sciences has the potential not only to improve the training of the next generation of researchers and practitioners but also to significantly enhance the collaborative skills of individuals in teams and the organizational systems in which they work. After all, because interdisciplinary researchers must constantly teach and learn from one another, teaching and learning infuse everything translational researchers do, from bench to bedside to storefront. An understanding of learning research and its core principles should thus be central, not peripheral, to the work of translational researchers and practitioners (Seyhan, 2019).

The term 'learning sciences' refers to an interdisciplinary field of scholarship that explores the mech anisms by which learning occurs and identifies practices that facilitate learning (P. Brown et al., 2014; Sawyer, 2014; Sommerhoff et al., 2018). The learning sciences draw on a diverse set of including cognitive and developmental psychology, neuroscience, computer science, sociology, and anthropology (Ambrose et al., 2010). In addition to challenging long-standing myths about teaching and learning (A. Brown & Kaminske, 2018; Nancekivell et al., 2020; Norman & Riener & Willingham, 2010), the learning sciences distill research on learning into principles and strategies to enhance teaching. Not incidentally, the learning sciences have evolved over much the same timeframe as translational science, tackling the same problem (bringing research into practice)in a different sphere, and grappling with many of the same issues, e.g., promoting innovation within large and often hide-bound systems and

creating inclusive and welcoming environments that foster intellectual risk-taking and interdisciplinary exchange. In a previous article (Norman 2021), we identify a set of key learning principles we believe are directly applicable in the roles of translational research. These principles synthesize half a century of research on how learning works (Ambrose et al., 2010). They are not specific to any discipline or student level and, thus, apply across learning contexts and modalities. Moreover, they are sufficiently broad enough to encompass new discoveries and formulations. For simplicity, these principles can be organized three categories: acquisition and integration of knowledge, social and emotional components of learning, and elements of skill-building. While we explore the principles themselves elsewhere (Norman & Lotrecchiano, 2021), our goal in this paper is to bring attention to the central role of learning across the translational enterprise and, thus, the critical role the learning sciences can work, not just in traditional classroom and training settings but also on research teams and across organizations. We outline the role of learning on the individual, team, and organizational levels within the translational learning ecosystem, demonstrate the relevance of learning principles as they apply to these three levels, and argue that learning science is foundational to the success of the translational science movement and is, in fact, the ultimate translational science.

THE TRANSLATIONAL LEARNING LANDSCAPE

Learners in the clinical translational setting are already sophisticated, highly trained individuals and are fully vetted in their own disciplines. These learners have a multitude of professional goals that are often complex and dependent on more than simply learning new tasks. Instructors come from a range of backgrounds from medicine to social work, from statistics to the humanities, and from clinical practice to philosophy. They themselves are typically trained in one area though they are often asked to supplement their own training with cross-disciplinary perspectives where they sometimes struggle. And unlike traditional education, these instructors possess a variety of roles from tenured faculty at universities, to clinical posts, to staff positions and community stakeholders, each their own brand of expertise. Duration and time variations range from full degree programs to short professional workshops, face-to-face, hybrid, and online sessions. These often target learning praxis where theory and practice interface in clinical application, laboratory training and mentoring, technical and social skill training, disciplinary and cross-disciplinary studies, individual and teamtaught modules. These different modalities all constitute a complex array of environments where clinical and translational workforce are involved.

For individuals, the translational learning landscape requires a commitment to human intrapersonal and interpersonal competency-building with a predisposition to lifelong learning (Senge, 2006). The tudes, behaviors, and cognitions are intentional alterations that allow one to be receptive to tion and change (Garvin et al., 2008). At times, individuals will be required to commit to learning about new ways of leading and managing, communicating, problem solving, and most importantly serving as a conduit for building trust into the translational science system (Uhl-Bien et al., 2007).

For teams, whether research teams or administrative units, they represent a microcosm of a learning organization and the working unit by which organizations learn and adapt (Lotrecchiano, 2011). Because the best and most nuanced translational science requires teams skilled at navigating complexity, engaging diverse perspectives, and thinking outside the box (Zerhouni, 2003), our goal should be fostering learning teams that are the direct product of learning organizations and thus are nurtured and supported by environments that see knowledge as the true mediator in translational science. In other words, groups perform both taskwork and teamwork to ensure that attitudes, behaviors, and cognition

are calibrated to ensure designed outcomes and goals are achieved (Garvin et al., 2008).

For organizations, the question of how to foster institutions that prioritize learning, adaptation, and agility has been addressed in the literature on complexity leadership and continues to be a concern in the team science literature (G. Jones, 2000). It promotes a departure from the leader-centric notion of influence typical of the manufacturing economy with its emphasis on leader characteristics and relationship with workers to the adoption and management of emergent and ments and systems that typify the knowledge and information economy that dominates the 21st century (Fiore, 2012; Fischer, 2000). Complex and distributed leadership models reorient organizations and teams around knowledge, learning, and flexibility (Fiore, 2012; Lotrecchiano et al., 2020; 2020). Individuals, groups, and organizations serve as unique components of entire systems and thus leadership is more so the influence over processes rather than people and things (McHale et al., 2019).

First, we acknowledge that, as described, clinical translational efforts are intrinsically dependent on learning on the individual, team, and organizational levels. Thus, we need to consider different types of learning—applied, academic, scholarly, and social— as equal partners in the same ecosystem. Instead of applying complex techniques to this 'new vision' for learning in the clinical translational landscape, we find it more appropriate to speak from the position of competence needed to accomplish these goals. As such, we draw the basic competencies found in translational, team, and implementation sciences as guiding foundational tenets as we describe how core learning principles are used within it (Achtenhagen et al., 2003; Northouse, 2007; Uhl-Bien et al., 2007). These, coupled with definitions and examples, are needed so that those less versed in learning science can embrace what is known from it while they equally apply their expertise to the scientific tasks at hand (Seyhan, 2019).

Second, to accomplish what we have stated in the last points, there is a need to simplify the otherwise complex tablature of educational theory and practice in the clinical translational setting. Teaching is a reflective practice requiring continual self-awareness, reflexivity with one's environment, and an acute recognition of how one's positionality to issues and problems affects their conscious scious bias (Volberda, 1996). We have chosen to be specific and to highlight teaching and learning principles based on their applicability to Clinical and Translational Science (CTS) using enduring principles that can be applied to the micro, meso, and macro levels, backed up by self-reflection questions for instructors and learners to utilize in their own contexts as they seek to apply the principles. These questions will allow those who generally do not embrace an evidence-based learning approach to adopt practices quickly and easily in their work that will contribute to better decision making about instructional content and the development of more inherently sound learning environments.

Third, we provide insight into how understanding the multilevel nature of clinical and translational learning environments provides insights into the unique character of a translational learning tem. Learning principles are applicable to individual, team, and organizational functions. adaptation are key when working across the sciences and across the multiple layers of an enterprise. Our approach addresses this multilevel environment, thus addressing how learning is central to all aspects of the translational science enterprise.

A learning ecosystem for translational research (Figure 1) recognizes the need for individuals, teams, and organizations to embrace the core processes of translation, teaming, and implementation, all of which require learning and change as part of their contribution to enhancing and affecting health and health systems (Schwandt & Gorman, 2004) and are higher order learning activities. These represent the

functional and transformational elements that make translational science unique and support the goals of this "newest youngest science" charged with developing "new pathways" (Austin, 2018; Zerhouni, 2003). By the intersection of these contributing core disciplines, five grounding domains of competence are key to successful engagement within the translational learning ecosystem that go beyond mere cognition but also include social and humanistic lifelong learning principles. These are facilitating team affect (or bonding), team communications, the management of research teams, collaborative problem solving, and leadership (Lotrecchiano et al., 2020).

Each of these domains has both individual, team, and organizational components and represents the catalysts for teaching and learning, namely, prior knowledge, the organization of knowledge, motivation, mastery, practice and feedback, cognitive load, climate, and metacognition (Figure 1). Critical to achieving the goals of this multilevel learning system requires a deep knowledge of these learning principles that, once understood, will assist in ensuring that the goals of the translational science community can be met using sound learning science. To extrapolate these principles, we provide an overview of these core principles, applications on the individual, team, and organizational levels, reflective questions about how one might apply each principle, and implications for the overall ecosystem.

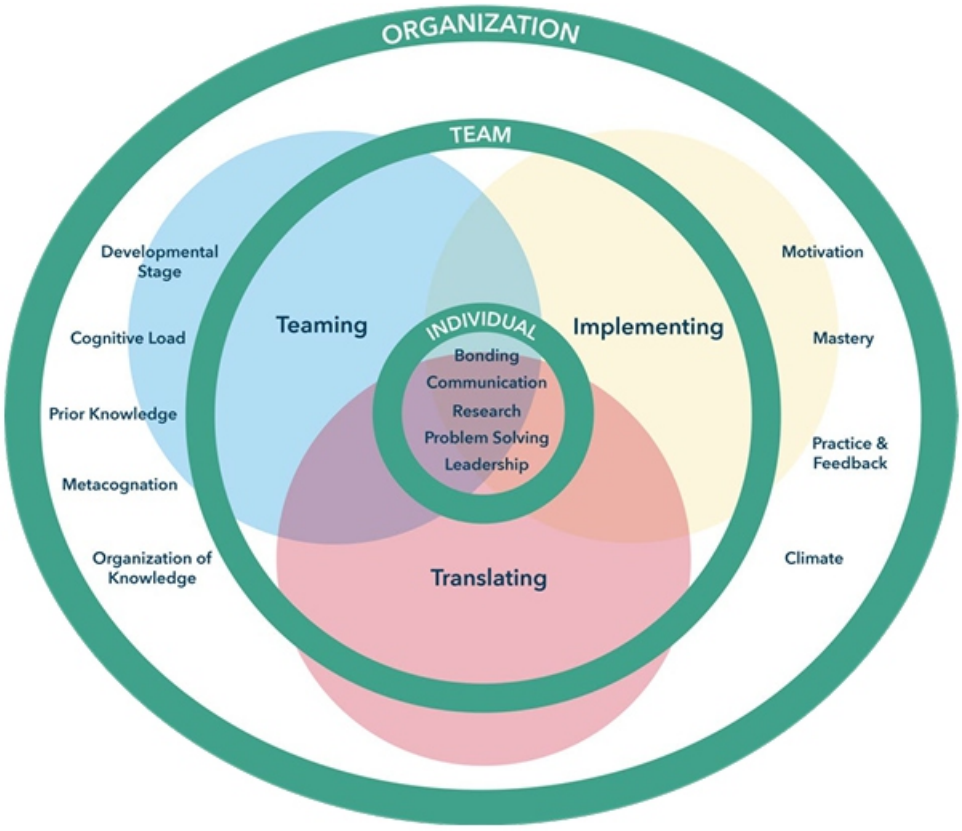


Figure 1. The Translational Learning EcoSystem

THE TRANSLATIONAL LEARNING ECOSYSTEM

We utilize the term ecosystem in a way that has been adopted not only in learning but also across several fields to describe the complex arrangement of efforts within translational science. "A learning

ecosystem is a system of people, content, technology, culture, and strategy, existing both within and outside of an organization, all of which has an impact on both the formal and informal learning that goes on in that organization" (Eudy, 2018). Much emphasis has been placed on the psychological and cognitive properties of learning in individuals (Center for Leading Innovation & Collaboration, 2021); indeed, most conceptualize learning as an individual level vocation. However, proaches to learning have emerged that are more highly steeped in group and social learning, emphasizing that learning requires social grounding and interactions within groups (Moore & Khan, 2020). Others have even promoted that life-long learning has sensemaking properties that require one to constantly problem solve through the culmination of (a) cues or information from one's environment that act as triggers or that signify that meaning is required; (b) a framework or knowledge structure (Klein et al., 2020; Lotrecchiano et al., 2016; McAllister, 1995; Schön, 1987; Weick, 1995) that includes a set of elements, rules, or values that have served as a guide to understanding; and (c) a relationship, or script, that links the new information to the framework, all of which would suggest that learning in an interactive engagement with one's surroundings and the entire environment in which they interact on emotional, behavioral, cognitive, and humanistic levels (Schwandt, 2005). Unlike oversimplified constructions of learning, here, making 'sense' of the world and applying one's interpretation are matters of grounded identity, retrospection, awareness of one's environment, through social, ongoing, focused cues that are driven more by plausibility than accuracy (Jain et 2010). Table 1 serves as a means of organizing core learning principles as they apply to different levels of the translational environment, along with universal reflective questions for instructors and learners, as well as the implications of the principles to impact the overall ecosystem.

Online ISSN: 1521-4672 Print ISSN: 1547-9684

Table 1: Learning Principles, the Characteristics of Effective Learning at Individual, Team, and Organizational Levels, Reflective Questions, and Implications for Influencing the Ecosystem

Core Learning Principles	Individual level	Team level	Organizational level	Reflective Question	Implications for Influencing the Ecosystem
Acquisition and Integration of Knowledge					
Prior Knowledge: Learners' prior knowledge can help or hinder learning	Successful Learners seek to connect new knowledge to existing knowledge, while identifying and addressing gaps, misconceptions, and other prior knowledge problems.	Learning Teams create opportunities for members to share knowledge, recognizing and speaking to the knowledge gaps of team members from different domains.	Learning Organizations nurture the exchange of knowledge from multiple inputs.	*What do learners currently know or believe that I must address to effectively build new knowledge?*	Develop mechanisms and opportunities in courses, on teams, and in organizations to discuss the knowledge that differently positioned learners bring, as well as misconceptions and knowledge gaps that might impede progress. Use this information to collectively build more robust knowledge structures.
Organization of Knowledge: How learners organize knowledge influences how they learn and apply what they know	Successful Learners develop effective and flexible ways to organize knowledge to meet varied goals.	Learning Teams combine different types of expertise and create opportunities to explain contextualize how they organize knowledge within their respective domains	Learning Organizations utilize agile mechanisms to organize, share, and disseminate different types of knowledge.	*What organizational frameworks do learners need to connect and use information effectively, and how can I help them develop these frameworks?*	Allocate space and time in group settings to discuss various ways of organizing knowledge to reconcile cognitive frameworks and develop shared mental models.
Cognitive Load: The intentional connecting of seemingly unrelated or extraneous information	Successful learners will be skilled in how to integrate knowledge for the purpose of expressing thoughtful meaning.	Learning teams will emphasize how constant emphasis on navigating similarities and differences in collective expertise is necessary.	Learning organizations will develop structures so that integrate knowledge become an emphasized and normative activity.	*What learning processes need to be developed so that learning is a foundational tenet while decreasing extraneous cognitive load?*	Emphasize how the task of translation is to exchange, integrate and simplify the complexity associated with teaming, translating, and implementing.

Core Learning Principles	Individual level	Team level	Organizational level	Reflective Question	Implications for Influencing the Ecosystem
Metacognition: To become self-directed learners, learners must monitor and adjust their approaches to learning.	Successful learners assess the demands of a task, evaluate their own strengths and weaknesses, devote time to planning, monitor their progress as they work, and take time after a project to reflect on their performance.	Learning Teams allocate time for task assessment and planning, designate opportunities mid-project to assess and modify processes, and take time after project completion to discuss and capture lessons learned.	Learning Organizations designate opportunities for collective reflection to identify and foster effective practices.	*How can I provide appropriate opportunities for planning, monitoring, and reflection to promote metacognition?*	Build structured opportunities (during classes and trainings, at the mid- and endpoints of projects, and after major new institutional initiatives) to reflect and distill lessons learned. Be deliberate about developing the habit of reflection. Establish mechanisms for preserving and acting on the insights generated as a normative throughput activity.
Social and Emotional Components of Learning					
Motivation: Learners' motivation determines, directs, and sustains what they do to learn.	Successful learners are aware of the important role of expectancy and value (including autonomy, mastery, relatedness, and purpose) in motivation, and leverage them to maintain motivation and persistence.	Learning teams identify the goals and motivations of team members and seek to align them to reach optimal performance.	Learning organizations provide recognition and rewards matched to the goals and ambitions of members, while minimizing obstacles to success.	*How can I help to build value and expectancy to spark and sustain motivation?*	Work to increase the factors that enhance motivation, whether in classrooms, on research teams, or among faculty and staff. Look to align individual goals with group goals, highlight the larger purpose of tasks and outcomes, reduce unnecessary obstacles, encourage independence, create opportunities to demonstrate mastery, and foster strong social connections.
Climate: Learners' current level of development interacts with the social, emotional, and intellectual climate of the course to impact learning.	Successful learners attend to their own learning needs and seek out environments that support their intellectual growth	Learning Teams recognize the importance of trust and work to build an environment that promotes psychological safety.	Learning Organizations prioritize the development of an equitable and inclusive work environment.	*How can I foster and sustain an environment that provides learners the support and safety they need thrive?*	Draw on the knowledge and expertise of learners. Be aware of how subtleties in tone and messaging affect climate and actively work to create inclusive team and organizational environments.

Online ISSN: 1521-4672 Print ISSN: 1547-9684

Core Learning Principles	Individual level	Team level	Organizational level	Reflective Question	Implications for Influencing the Ecosystem
Presence: The ability of learners to engage through social, cognitive, and teaching presence	Successful learners engage with others, content, and instructive influences equally to maximize learning outcomes	Learning Teams exercise engagement in multiple ways that include interpersonal, mental, and exploratory experiences.	Learning Organizations construct avenues and secure resources that ensure presence is a priority no matter the modality or context.	*How can one utilize learning opportunities to respond to the social, cognitive, and relational needs of learners?*	View learning opportunities as holistic experiences that tend to the social, cognitive and relational needs of all involved and utilize instructional design to satisfy these different needs.
Elements of Skill Building					
Mastery: To develop mastery, learners must acquire competent skills, practice integrating them, and know when to apply what they have learned.	Successful learners recognize that mastery is developmental and work to acquire key skills, seek opportunities to practice integrating them, and learn to use them appropriately in diverse contexts.	Learning Teams develop collective mastery by identifying and integrating members with necessary skill sets and working to utilize these skill sets effectively across contexts.	Learning Organizations identify desired areas of specialization and create opportunities for skill acquisition, integration and application.	*What are the domains of mastery I hope to develop, and how can I help learners acquire the relevant component skills, learn to integrate them, and apply them in appropriate contexts?*	Be aware of and work against expert blind spots in all contexts. Recognize that mastering complex skills requires time and patience. Provide opportunities, both for individuals and groups, to analyze complex tasks, break them into their component skills, practice these skills in isolation and then in combination, identify when and where these skills are applicable, and learn to apply them effectively to a range of problems.
Practice and Feedback: Goal-directed practice, coupled with targeted feedback enhances the quality of learning.	Successful learners identify skills they need to build, pursue opportunities for practice, and seek out feedback.	Learning Teams designate opportunities for members to learn and practice new skills and prioritize the sharing of feedback.	Learning Organizations create a culture in which regular sharing of feedback is normative.	*What specific skills do learners need to practice and what kinds of feedback can I provide to help them improve?*	Identify skills and subskills that individuals, teams, or organizations need and lack, and create opportunities for deliberate practice, allowing sufficient time for repetition. Create mechanisms and opportunities to provide constructive, timely feedback on individual and group performance.

Online ISSN: 1521-4672 Print ISSN: 1547-9684

DISCUSSION

Translational research, team science, and implementation science share a core reliance on ongoing, multi-dimensional, distributed learning. Moreover, the history of these pursuits and of education have moved on parallel tracks, shifting increasingly towards a team orientation, geographical distribution, technological mediation, attention to "soft" skills, and a mandate for diversity, equity, and inclusion. As such, these enterprises have much to learn from and teach one another. It is our contention that the principles of learning – rarely brought to the forefront of consideration in translational science discussions – underlie essential facets of learning at the individual, team, and organizational levels and in all aspects of translational research, team science, and implementation science. Moreover, as the individual competency domains necessary to ensure productive, satisfying teamwork and agile organizations become more clearly defined in the literature (Uhl-Bien et al., 2007), the mechanisms by which we acquire these competencies and teach them to others will become more salient.

As demonstrated, there is much that learning science offers to translational research. This includes a deep understanding of the psychology of motivation, recognition of how new knowledge builds on prior knowledge, and strategies for shaping our work environments to foster inclusive learning. The learning sciences explain why the way we organize knowledge influences how we are equipped to use it, whether working alone or in teams, how feedback can be most effective, and how enlisting the cycle of metacognition more intentionally can make us more reflective and adaptive as learners. A deep understanding of the learning sciences and its explication of the core mechanisms of learning can illuminate learning at all the levels – individual, team, and organization – explored here, helping us to become more effective teachers, mentors, team members, and administrators and positioning our students, teams, and organizations for the rapid evolution and innovation required of our fast-changing, complex world.

STUDY HIGHLIGHTS

In this paper, we have sought to connect the learning sciences with translational science. We have tried to tailor the principles we have extracted from voluminous scholarship in the learning sciences to fit the contexts in which translational learning occurs, and we have attempted to simplify those paring them down to make them accessible and useful to people outside education. We have argued that, because learning is the ultimate translational science, learning sciences are tailor-made for the most essential goals of translational science, and it is time we made better use of this rich and relevant literature. The argument we make is based on the following key points.

- Learning is intrinsically linked to translation, teaming, and implementation in the clinical translational enterprise.
- The integration of learning science is critical to the success of the clinical translational enterprise.
- The clinical translational enterprise needs to give equal attention to learning on the individual, team, and organizations level to maximize success.

CONCLUSION

We hope this article will consolidate the understanding of and provide a shared vocabulary for those already engaged in explicitly educational work and familiar with the learning sciences, while at the same time using the learning sciences to shed new light on the translational landscape, where learning

constantly unfolds yet learning research has rarely been applied. We offer this as the beginning of what we hope will be a long and fruitful discussion about avenues to foster learning in all aspects of translational science.

ACKNOWLEDGMENTS

Research reported in this publication was supported by the National Center for Advancing Translational Sciences of the National Institutes of Health. The University of Pittsburgh Clinical and Translational Science Institute (CTSI) NIH/NCATS: 1UL1TR001857. The authors acknowledge the creative work for Figure 1 to Leah Sims, Graphic Designer and Animator, George Washington University, Libraries and Academic Innovation, Instructional Core for Advocacy, Research, and Excellence (ICare) in Teaching and Learning. We also acknowledge the proofreading of Paige McDonald, EdD, George Washington University School of Medicine and Health Sciences.

CONFLICTS OF INTERESTS

None.

REFERENCES

Achtenhagen, L., Melin, T., Mullern, & Ericson, T. (2003). Leadership: The role of interactive strategizing. In R. W. A. Pettigrew, L. Melin, C. Sanchez-Runde, F.A.J. Van Den Bosch, W. Ruigrok, & T. Numagam (Eds.), Innovative forms of organizing: International perspectives. Sage Publications. https://doi.org/10.4135/9781446219386.n3

Ambrose, S., Bridges, M., DePietro, M., Lovett, M., & Norman, M. (2010). How learning works: Seven research-based principles for smart teaching. Jossey-Bass. https://doi.org/10.1111/teth.12013

Austin, C. (2018). Translating translation. Nature Reviews Drug Discovery, 17, 455-456. https://doi.org/10.1038/nrd.2018.27

Braithwaite, J., Churruca, K., Long, J., Ellis, L., & Herkes, J. (2018). When complexity science meets implementation science: A theoretical and empirical analysis of systems change. BMC Medicine, 16, 1-14. https://doi.org/10.1186/s12916-018-1057-z

Brown, A., & Kaminske, A. (2018). Five teaching and learning myths—Debunked: A guide for teachers. Routledge.

Brown, P., Roediger, H., & McDonald, M. (2014). Make it stick: The science of successful learning. Harvard University Press.

Center for Leading Innovation & Collaboration. (2021). Core competencies for clinical and translational research. https://clic-ctsa.org/education/competencies

Eudy, R. (2018). What is a learning ecosystem? And how does it support corporate strategy? https://www.ej4.com/blog/what-is-a-learning-ecosystem

Fiore, S. (2012). President's essay: The "ABC's" of interdisciplinarity: Understanding the attitudinal, behavioral, and cognitive factors involved in interdisciplinary research. INGRoup Newletter, 3(1), 4-6.

Fischer, G. (2000). Lifelong learning—More than training. Journal of Interactive Learning Research,, 11(3), 265-294.

Garvin, D., Edmondson, A., & Gino, F. (2008). Is yours a learning organization? Harvard Business Review, 86(3), 109-116.

Jain, R., Triandis, H., & Weick, C. (2010). Managing research, development, and innovation: Managing the unmanageable. John Wiley & Sons.

Jones, B. F., Wuchty, S., & Uzzi, B. (2008). Multi-university research teams: Shifting impact, geography, and stratification in science. Science, 322, 1259-1262. https://doi.org/10.1126/science.1158357

Jones, G. (2000). Organizational theory. Addison-Wesley.

Klein, J., Misra, S., & Lotrecchiano, G. (2020). Communication in inter- and trans-disciplinary teams. In G. R. Lotrecchiano & S. Misra (Eds.), Communication and transdisciplinary teams. Informing Science Press.

Lotrecchiano, G. (2011). Leadership is as simple as a game of marbles: Transdisciplinary, learning and complexity in fairies, keepsies and mibs. Integral Leadership Review, 11(4). http://integralleadershipreview.com/3261-leadership-is-as-simple-as-a-childs-game-of-marbles/

Lotrecchiano, G., DiazGranados, D., Sprecher, J., McCormack, W., Ranwala, D., Wooten, K., & Brasier, A. (2020). Individual and team competencies in translational teams. Journal of Clinical and Translational Science, 5(1), E72. https://doi.org/10.1017/cts.2020.551

Lotrecchiano, G., McDonald, P., Corcoran, M., Harwood, K., & Ekmekci, O. (2016). Learning theory, operative model and challenges in developing a framework for collaborative, translational and implementable doctoral research. 9th annual International Conference of Education, Research and Innovation, Seville, Spain.

McAllister, D. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. Academy of Management Journal, 38(1), 24-59. https://doi.org/10.2307/256727

McHale, S., Ranwala, D., DiazGranados, D., Bagshaw, D., Schienke, E., & Blank, A. (2019). Promotion and tenure policies for team science at colleges/schools of medicine. Journal of Clinical and Translational Science, 3(5), 245-252. https://doi.org/10.1017/cts.2019.401

Moore, J., & Khan, S. (2020). Core competencies for implementation practice. Health Canada: The Center for Implementation.

Nancekivell, S., Shah, P., & Gelman, S. (2020). Maybe they're born with it, or maybe it's experience: Toward a deeper understanding of the learning style myth. Journal of Educational Psychology, 112(2), 221-235. https://doi.org/10.1037/edu0000366

Norman, M., & Lotrecchiano, G. (2021). Translating the learning sciences into practice: A primer for clinical and translational educators. Journal of Clinical and Translational Science, 5(1), e173. https://doi.org/10.1017/cts.2021.840

Northouse, P. (2007). Leadership: Theory and practice. SAGE Publications.

Riener, C., & Willingham, D. (2010). The myth of learning styles. Change: The Magazine of Higher Learning, 42(5), 32-35. https://doi.org/10.1080/00091383.2010.503139

Sawyer, R. (2014). The Cambridge handbook of the learning sciences. Cambridge Univeristy Press.

Schön, D. (1987). Educating the reflective practitioner. Jossey-Bass.

Schwandt, D. (2005). When managers become philosophers: Integrating Learning with Sensemaking. Academy of Management Learning & Education, 4(2), 176-192. https://doi.org/10.5465/amle.2005.17268565

Schwandt, D., & Gorman, M. (2004). Foresight or foreseeing? A social action explanation of complex collective knowing. In H. Tsoukas & J. Shepherd (Eds.), Managing the future: Foresight in the knowledge economy (pp. 7797).

Senge, P. (2006). The fifth discipline: The art and practice of the learning organization. Broadway Business.

Seyhan, A. (2019). Lost in translation: The valley of death across preclinical and clinical divide – Identification of problems and overcoming obstacles. Translational Medicine Communications, 4(1), 1-19. https://doi.org/10.1186/s41231-019-0050-7

Sommerhoff, D., Szameitat, A., Vogel, F., Chernikova, O., Loderer, K., & Fischer, F. (2018). What do we teach when we teach the learning sciences? A document analysis of 75 graduate programs. The Journal

of the Learning Sciences, 27(2), 319-351. https://doi.org/10.1080/10508406.2018.1440353
Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. The Leadership Quarterly, 18, 298-318. https://doi.org/10.1016/j.leaqua.2007.04.002
Volberda, H. (1996). Toward the flexible form: How to remain vital in hypercompetitive environments. Organization Science, 7(4), 359. https://doi.org/10.1287/orsc.7.4.359
Weick, K. (1995). Sensemaking in organizations. Sage.
Wuchty, S., Jones, B., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. Science, 316(5827), 1036-1039. https://doi.org/10.1126/science.1136099
Yeo, R. (2020). Crossing knowledge boundaries: From team learning to knowledge teams. Small Group Research, 51(6), 700–737. https://doi.org/10.1177/1046496420919929
Zerhouni, E. (2003). The NIH Roadmap. Science, 302(5642), 63-72. https://doi.org/10.1126/science.1091867

AUTHORS

Dr. Gaetano Lotrecchiano, EdD, PhD, is an Associate Professor of Clinical Research and Leadership at the George Washington University School of Medicine and Health Sciences where he specializes in team science. He is the University Associate Dean for Innovative and Collaborative Pedagogy and leads the Instructional Core for Advocacy, Research and Excellence in Teaching and Learning (Icare). He is the co-editor of Communication in Transdisciplinary Teams. Informing Science Press (2020). He is a Morton A. Bender awardee for Teaching Excellence and a member of the GW Academy of Distinguished Teachers.

Dr. Marie Norman, PhD, is an Associate Professor of Medicine and Clinical and Translational Science at the Institute for Clinical Research Education at the University of Pittsburgh. She directs the Innovative Design for Education and Assessment (IDEA) Lab and co-directs the Clinical and Translational Science Institute's Team Science core, where she focuses on providing tailored human centered design training to researchers. Norman is co-author of the book How Learning Works: Seven Research-Based Principles for Smart Teaching (2010).

Online ISSN: 1521-4672 Print ISSN: 1547-9684

THE RELATIONSHIP BETWEEN PERCEIVED ORGANIZATIONAL SUPPORT AND TURNOVER INTENTION: THE MEDIATING ROLE OF JOB MOTIVATION AND AFFECTIVE AND NORMATIVE COMMITMENT

Riccardo Sartori*
Andrea Ceschi
Mattia Zene
Lorenzo Scipioni
Michele Monti
Department of Human Sciences, University of Verona, Verona, Italy

ABSTRACT

Aim/Purpose The study aims to examine the mediating role of job motivation and affective and normative commitment on the relationship between perceived organizational support (POS) and job turnover intention. .

Background POS refers to employees' beliefs and perceptions concerning the extent to which the organization values their contributions, cares about their well-being, and fulfils their socio-emotional needs. To date, research has shown that employee turnover is a complex construct resulting from the interplay of both individual and organizational variables, such as motivation and climate. POS, job motivation, affective and normative organizational commitment, and turnover intentions. .

Methodology An individual, team, and organizational conceptual framework for learning in translational ecosystems is developed drawing on the learning science literature, a synthesis of 9 key learning principles and integrated with core competencies for translational science.

Contribution / Findings Specifically, in this research, we aim at examining (i) the indirect effect of POS on turnover intention via (ii) job motivation and (iii) normative and affective Results show that high POS is associated with high levels of job motivation and affective and normative commitment, which in turn are negatively linked to turnover intentions.

Recommendations for Practitioners To limit employees' turnover intentions, organizations should be aware of the role of POS as conducive of high job motivation and, consequently, affective and normative commitment, which, together, can serve to decrease turnover intention. To avoid turnover intention and keep workers and employees within an organization, it is necessary to consider that POS cannot prevent turnover intention on its own. Job motivation and organizational commitment were found to mediate POS influence over turnover intention; therefore, it is also necessary to increase the rate of affective and normative commitment in order to decrease turnover intention

Recommendations for Researchers Researchers should not lose sight of the importance of studying

and delving into the concept of turnover intention given that, from an organizational point of view, losing personnel means losing competencies, which need to be replaced through assessment, selection, training, and development, processes that are often challenging and expensive.

Impact on Society Effective attention to employee needs can promote retention through motivation and engagement, thereby reducing the intention to leave the organization. This can help to lower effective turnover rates and mitigate the negative effects of resignations.

Future Research Future research should further investigate the role of motivation and commitment, other than additional variables, for POS and turnover intention. Longitudinal studies and further testing are required to verify the causal processes stemming from our model. Future research could consider linking employees' selfreported measures with objective data concerning turnover rates

Keywords perceived organizational support, turnover intention, job motivation, affective commitment, normative commitment

INTRODUCTION

Organizations, whether they are for profit or not, are usually facing problems related to research, recruitment, management, and maintenance of personnel, with particular regards for those qualified workers and employees whose contribution is fundamental for organizational efficiency (Sartori et al., 2014, 2022). From an organizational point of view, losing personnel means losing competencies, which need to be replaced through assessment, selection, training, and development processes that are often challenging and expensive (Sartori & Ceschi, 2013; Sartori et al., 2018, 2022). Thinking about the very recent phenomenon of the Great Resignation (Sull et al., 2022), loosing personnel represents a moral, pragmatic, and social issue. For these reasons, employee turnover, defined as the rate at which employees leave a company and are replaced by new ones, is a variable that tions should keep under control (De Winne et al., 2018). Accordingly, much research has been conducted to investigate the relationship between turnover intention, i.e., employees' plans to leave their positions, and several organizational variables, such as job satisfaction (Mobley, 1977; Tett & Meyer, 1993), job performance (Tomietto et al., 2015), leader-member exchange (Harris et al., 2005), emotional intelligence (Brunetto et al., 2012), organizational commitment (Galletta et al., 2011; Saeed et al., 2014) and perceived organizational support (Dawley et al., 2010).

To date, research has shown that employee turnover is a complex construct resulting from the interplay of both individual and organizational variables, such as motivation and climate, that still need to be extensively described (Dawley et al., 2010). Accordingly, scholars have discussed how perceived organizational support (POS from here on) could play a critical role on leveraging turnover intention (Maertz et al., 2007). POS refers to employees' beliefs and perceptions concerning the extent to which the organization values their contributions, cares about their well-being, and fulfils their socioemotional needs (Costantini et al., 2018; Eisenberger et al., 1986; Tomietto et al., 2019). Previous evidence showed that POS could affect and contribute to developing job satisfaction and performance (Chen et al., 2009; Jha, 2009; Mobley, 1977), as well as job motivation (Gillet et al., 2013) and normative and affective commitment (Aubé et al., 2007), which are further investigated in this study.

Indeed, based on the relationships proposed by scientific literature and further elaborated in the literature review, the relationship between workers' perceived organizational support and the reduction of turnover intention is explored, passing through the individual mechanisms underlying this relationship: work motivation and commitment. Also motivating this investigation is the fact that there is relatively little research in the literature that has specifically examined these individual mechanisms and their possible mediating effect on turnover intention. Therefore, we believe that our research fills an important gap in the existing literature by examining these relationships in more detail.

In this paper we aim to report an examination of (i) the indirect effect of POS on turnover intention via (ii) job motivation and (iii) normative and affective commitment. Precisely, we ask whether job motivation and affective and normative commitment can mediate the effect of POS on turnover intention. Furthermore, we ask whether, in the mediating relationship with POS and turnover intention, job motivation predicts the level of organizational and affective commitment.

Promoting empirical knowledge on the indirect hindering effect of perceived organizational support on turnover intention can support both organizational and the scientific aims. These pieces of knowledge can promote the development of strategies and interventions aimed at reducing turnover in organizations, ultimately leading to improved retention and productivity. Scientific literature has extensively discussed the role of perceived organizational support on reducing workers' intention turnover, but little has been said about the individual cognitive mechanisms that mediate this relationship. Thus, by sharing and disseminating these pieces of knowledge, researchers in the field can build on and advance existing theories and models related to organizational support and turnover intention.

LITERATURE REVIEW

EMPLOYEE TURNOVER AND TURNOVER INTENTION

Employee turnover is defined as a process whereby employees decide to leave their organization, i.e., voluntary employee turnover, or the organization decides to dismiss employees, i.e., involuntary employee turnover (Anvari et al., 2014; Jha, 2009; Saeed et al., 2014). Our study focuses on voluntary turnover, specifically on the employees' intentions to interrupt their relationship with the organization, which may be due to low levels of satisfaction (Hom & Kinicki, 2001) or the finding of a more rewarding alternative (Albalawi et al., 2019). Our purpose is to examine the motivations behind voluntary, rather than involuntary, employee turnover in order to identify potential avenues for organizational intervention. Specifically, we aim to explore those individual factors that may contribute to an employee's intention to leave an organization and to explore how these factors can be addressed to reduce overall turnover rates.

Much research has been conducted on turnover intention (Cohen et al., 2015), its antecedents (W. J. A. Chang et al., 2013) and outcomes (Xiong & Wen, 2020). According to the Intermediate Linkage Model (Mobley, 1977), employees might decide to leave their organization based on a process including negative evaluation of the current job, the experience of job dissatisfaction, and the search for alternatives (Cohen et al., 2015; Tommasi et al., 2020; Tommasi & Degen, 2022; Xiong & Wen, 2020).

In addition to the factors that may lead to employee turnover, literature also provides evidence of its several consequences (Jha, 2009; Saeed et al., 2014; Snodgrass Rangel, 2018). Specifically, authors

highlight the high costs, both economic and in terms of other resources, that organizations need to face to replace the employees who quit (O'Connell & Kung, 2007). Organizations need to invest time, money and energy for assessment and selection processes that will lead to the admission of new personnel (Jha, 2009; Saeed et al., 2014). Indeed, from an organizational point of view, losing personnel often means losing competencies that need to be replaced through assessment, selection, training, and development processes, which can be challenging and expensive (Sartori et al., 2018, 2022).

The negative consequences of employee turnover do not impact only organizations. Employees are also likely to be affected, as employees who quit may lose the benefits of their job, ending up being victims of the possible neighbour's grass looks greener phenomenon (Jha, 2009), according to which employees may quit their job for another one estimated to be better but that turns out to be pretty much the same or even worse.

PERCEIVED ORGANIZATIONAL SUPPORT

In the light of the negative consequences of employee turnover, much research has been conducted to deepen knowledge on its drivers (Dawley et al., 2010; Griffeth et al., 2000; Hom et al., 1992; Tomietto et al., 2015). Among these, particular attention has been paid on POS as a critical precursor of turnover intention (Dawley et al., 2010; Fitria & Linda, 2019; Maertz et al., 2007). According to the Organizational Support Theory (OST; Eisenberger et al., 1986), employees develop POS in response to socio-emotional needs and the organization's willingness to reward the increased efforts made on its behalf (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002; Shore & Shore, 1995). Subsequently, based on a principle of social exchange with the organization, employees form opinions on their perceived values based on how they feel treated. That is, when the organization voluntarily guarantees certain resources, not because forced by circumstances, employees will perceive this as a recognition for, and approval of, their work (Kottke & Sharafinski, 1988).

To date, research has shown that POS is driven by a number of psychological perceptions, such as organizational justice (Ambrose & Schminke, 2003; Nazir et al., 2019), influence over policymaking (Eisenberger et al., 1986), participation in decision-making (Allen et al., 2003) and perceptions of organization-based self-esteem (Costantini et al., 2019). In addition, studies have shown that high POS leads to increased job satisfaction (Eisenberger et al., 1997; Maan et al., 2020), improvements in job performance (Shanock & Eisenberger, 2006), organizational commitment (Hochwarter et al., 2003; Ridwan et al., 2020) and decreased turnover rates (Rhoades & Eisenberger, 2002). Overall, the primary outcome of experienced continuous support from the organization is to incentivize employees and, consequently, reduce turnover intention by encouraging employees to put more effort into their duties (Abou-Moghli, 2015).

The objective of this research is to investigate the indirect relationship between employees' percep tions of organizational support and turnover intention. Relationship also shown to have direct effects in a study by Li et al.(2022). Adopting the well-established and mature job demands-resources model (JD-R), they conducted a cross-sectional study by which they found that perceived organizational support had a negative impact on the turnover intention of frontline healthcare staff. Besides, we expect such relationship to be mediated by job motivation and affective and normative commitment, as we will now outline.

JOB MOTIVATION

Job motivation refers to an energizing force within the individual that encourages employees towards specific actions (Battistelli et al., 2013; Pinder, 1998). This force determines the direction, intensity, and persistence of employees' positive attitudes in the field of their working experience (Battistelli et al., 2013; Gagné & Deci, 2005). Therefore, motivated employees are likely to be driven towards a greater working efficiency in carrying out their duties. According to Maslow's Hierarchy of Needs (Maslow, 1954), motivation responds to a set of needs (e.g., rest, well-being, belonging and acceptance). When these needs are fulfilled, there will be an increase in motivation. While the intensity with which needs manifest themselves varies across individuals (Deci & Ryan, 2008; Gagné & Deci, 2005), this theory has had high relevance within various working contexts because it suggests that the ways in which organizations are able to respond to individual intrinsic and internalized needs can determine one's motivation (Gagné & Deci, 2005).

Many authors have studied the association between POS and motivation in various working sectors. For example, Gillet and colleagues (2013), using the self-determination theory (Deci & Ryan, 2008) as a guiding theoretical framework, analyzed the possible relationship between POS and job motivation in 235 French police officers. Results highlighted a positive relationship between the two constructs. Another study was carried out by Darolia and colleagues (2010). It explored the extent to which POS, job motivation, and organizational commitment predict individual differences in job performance. Results underlined a strong positive association between POS and job motivation.

As for the relationship between job motivation and turnover intention, the study by Galletta and colleagues (2011) carried out on 442 nurses found a positive link between them. In addition, a cross-sectional study on 256 health workers by Bonenberger and colleagues (2014) found that job motivation was significantly associated with turnover intention.

Overall, these findings suggest that job motivation may mediate the relationship between POS and employee turnover. Consequently, we assume that:

Hypothesis 1: POS positively relates to job motivation.
Hypothesis 2: Job motivation mediates the association between POS and turnover intention.

NORMATIVE COMMITMENT AND AFFECTIVE COMMITMENT

According to the Social Exchange Theory (SET; Blau, 1964) and the Norm of Reciprocity (Gouldner, 1960), POS is considered as a precursor of organizational commitment. Commitment is defined as the employees' attachment to the organization, as well as its goals and values, which results in the employees undertaking some effort towards achieving the organization's aims (Meyer & Allen, 1997). This construct, as a three-dimensional model, consists of affective commitment (based on employees' emotional bonds with the organization evolved by positive work settings experience), continuance commitment (which refers to perceived economic and social costs of leaving, work-related as well as non-work-related), and normative commitment (which refers to the employees' sense of obligation to remain within an organization).

Specifically, based on results by Aubé and colleagues (2007), among others, which show that POS is positively and significantly correlated with affective and normative commitment but not with

continuance commitment, we only focused on the first two dimensions of organizational commitment. Well-motivated employees in a work setting can develop, over time, a sort of emotional attachment towards their organization. Regardless of the reasons for which this attachment is generated, the outcome will be an increasing identification between employees and organization in the way of acting (Meyer & Herscovitch, 2001).

Based on SET, Wayne et al. (1997) argue that over a certain period a norm of reciprocity between oranization and employees develops, and those who perceive lower inducements would be more likely to leave the organization. Consequently, an organization that offers greater support will probably create within the employees a sense of obligation to return the favor, i.e., high commitment (Allen et al., 2003). Moreover, it is likely that high commitment will result in low turnover, because, as a psychological attachment, commitment reduces voluntary turnover intention (Meyer & Allen, 1997).

Indeed, studies have shown commitment as one of the most critical negative precursors of turnover intention. Various empirical studies provided evidence from Asian, African, and western countries of the negative association between commitment and turnover intention (Galletta et al., 2011; Rashid & Raja, 2011; Van Dyk & Coetzee, 2012). Accordingly, commitment may stem as a result of POS and mediate its relationship with turnover intention. Therefore:

Hypothesis 3: POS positively relates to normative commitment and affective commitment.
Hypothesis 4: Normative commitment and affective commitment mediates the association between POS and turnover intention.

THE RELATIONSHIP BETWEEN JOB MOTIVATION AND AFFECTIVE AND NORMATIVE COMMITMENT

The literature suggests that both job motivation and organizational commitment are negatively associated with turnover intention (H. T. Chang et al., 2007; Houkes et al., 2003). In sharp contrast, in this study, in the wake of results by Aubé et al. (2007), we propose that the presence of high job motivation can lead in particular to the development of two out of three commitment dimensions, namely normative and affective. Based on the relationship between POS and job motivation, which is further investigated in this study, we propose the latter as a mediator between POS and commitment.

Meyer and colleagues (2004) noticed some similarities between motivation and commitment. In fact, they report that Pinder (1998) defined motivation as a body of energizing forces, while Meyer and Herscovitch (2001) identified commitment with a force connecting the individual to a course of action. Against this background, Battistelli and colleagues (2013) suggested that motivation and commitment could be complementary. Based on such a complementary perspective, we propose that job motivation constitutes a precursor of commitment. That is, highly motivated employees will develop an attachment to the organization because they perceive that their needs find satisfaction because of them belonging to the organization (Gambino, 2010). Moreover, such an attachment will lead to higher intentions to remain, which reflects in lower turnover intentions. Accordingly:

Hypothesis 5: Job motivation mediates the relationship between POS and affective and normative commitment
Hypothesis 6: Affective and normative commitment mediates the relationship between job motivation and turnover intention.

RESEARCH DESIGN

RESEARCH APPROACH

This research adopts a quantitative approach with a cross-sectional design. A company, an industrial organization located in the north of Italy, was approached through a formal request to participate in the study, which was presented to the target participants as a research project focused on examining the relationship between perceived organizational support and various employee outcomes. The data were collected as part of a standalone study, rather than as part of a larger assessment process such as a routine stress evaluation or organizational culture assessment. The objectives and methods of the present study were initially explained to the organization's managers to ensure that they understood the purpose of the study and were able to accurately communicate this information to the organization's workers. Participants were informed about the scope of the study and that their responses would be kept anonymous and used solely for the purpose of the study. By providing managers with information about the objectives and methods of the study, it was possible to ensure that the data collection process was conducted in an ethical and unbiased manner. The N = 159 participants were given 25 minutes to fill out paper and pencil questionnaires and the entire evaluation process took one month. Questionnaires were administered to employees during working hours. Once filled in, completed questionnaires were submitted in a locked urn at their disposal and collected by the researchers. After data collection, we screened questionnaires for missing data, and 16 questionnaires were eliminated.

RESEARCH METHOD

Research participants

The final sample consist of N = 143 (90% response rate) employees. Participants' age range between 20 and 58 years (Mage = 36; SDage = 9.4). The length of service varies from a minimum of 1 year to a maximum of 28 years (Mtenure = 7.5 years SDtenure = 6.3). As for education 0.7% indicated low education (elementary school diploma), 90.4% intermediate education (junior high school license, vocational and high school diploma), 4.2% higher education (bachelor's degree and postgraduate qualification). Gender-related information was not collected. In accordance with the scientific literature, it is difficult to identify significant differences for gender, especially on small samples. This limitation has been discussed in the Limitations section of the Discussion.

Measuring instruments

Questionnaires were in Italian, and data were collected using the available Italian validated versions for each scale. Scales that were not available in Italian were translated using the forward-backward procedure (Brislin, 1970).

Organizational Commitment. Twelve items from the scale developed by Meyer and colleagues (1993) were used to assess organizational commitment. Of these, six items were used to measure Normative Commitment (Cronbach's $\alpha = .79$) and six items to measure Affective Commitment (Cronbach's $\alpha = .84$). Example items used to assess normative commitment are "I would not leave my organization right now because I feel a sense of obligation to the people in it" and "This organization deserves my loyalty". Example items used to assess affective commitment are "I really feel as if this organization's problems are my own" and "This organization has a great deal of personal meaning for me". Responses were given

on 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Job Motivation. Job Motivation was measured by an Italian version of the 12-item of the Motivation at Work Scale by Gagné and colleagues (2010) (Cronbach's α = .83). Participants were asked to indicate for each of the statements the extent to which they currently correspond to one of the reasons why they do their work. Responses were given on a 7-point scale ranging from 1 (not at all) to 7 (exactly). Example items are "Because my work is my life and I don't want to fail" and "Because this job affords me a certain standard of living".

Perceived Organizational Support. POS was measured by an Italian version of the 36-item of the Perceived Organizational Support Scale by Eisenberger and colleagues (1986) (Cronbach's α = .91). Example items are "The organization really cares about my well-being" and "The organization is willing to extend itself in order to help me perform my job to the best of my ability". Responses were given on 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Turnover Intention. Turnover Intention was measured with the Italian version of the 2-item scale from Hom and colleagues (1984) (Cronbach's α = .82). Example items are "My current job is not address ing my important personal needs" and "I intend to search for a position with another employer". sponses were given on 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Statistical analyses

Data were processed using the statistical software package SPSS 21 for descriptive statistics and the structural equation modeling package AMOS 21 for hypothesis testing. We tested our hypotheses three models by using Structural Equation Modeling (SEM). The proposed models are shown in Figures 1-3. Mediating relationships were further tested using Bootstrap and the PROCESS macro (Hayes, 2015) in SPSS.

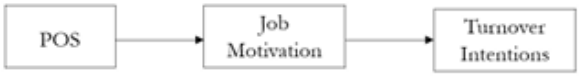


Figure 1 - Graphical Representation of Research Model 1.

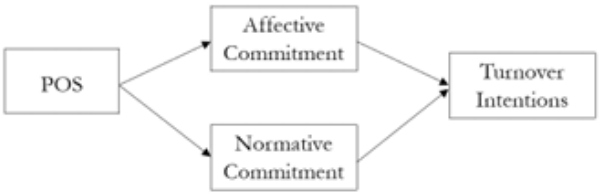


Figure 2 - Graphical Representation of Research Model 2.

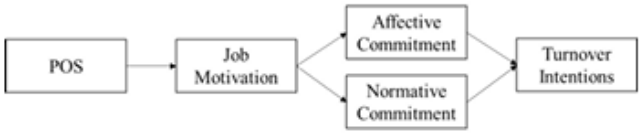


Figure 3 - Graphical Representation of Research Model 3.

RESULTS

STATISTICALANALYSES

Table 1 shows the means, standard deviations (SD) and correlations among the study variables.

Table 1. Means, Standard Deviations and Correlations Between the Study Variables

		Items	Alpha	Mean	SD	2	3	4	5
1	POS	36	.91	89.85	20.40	.61*	.50*	.36*	- .28*
2	Job Motivation	12	.83	41.10	10.34	-	.65*	.51*	- .35*
3	Affective Commitment	6	.84	19.64	5.39	-	-	.58*	- .53*
4	Normative Commitment	6	.79	15.95	5.10	-	-	-	- .52*
5	Turnover Intentions	2	.82	4.10	2.06	-	-	-	-

* $p < .001$, N = 143

As can be seen in Table 1, POS was found to be positively related to job motivation and both types of organizational commitment. POS was more strongly related to affective commitment compared to normative commitment. Turnover intention was negatively related to POS, as well as to affective and normative commitment. Job motivation was positively related to affective and normative commitment.

HYPOTHESIS TESTING

SEM of Model 1 fit the data well: $\chi2(2) = 5.09$, $p = .05$; $\chi2/df = 2.55$; TLI = .98; CFI = .99; RMSEA = .02 (Hu & Bentler, 1999). Results from Model 1 are reported in Figure 4.

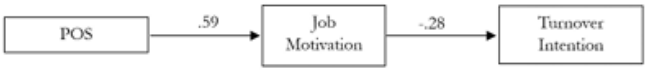


Figure 4 Results from Model 1

Also, SEM of Model 2 fit the data well: $\chi2(3) = 4.65$, $p = .04$; $\chi2/df = 1.55$; TLI = .99; CFI = .99; RMSEA = .04 (Hu & Bentler, 1999). Results from Model 2 are reported in Figure 5.

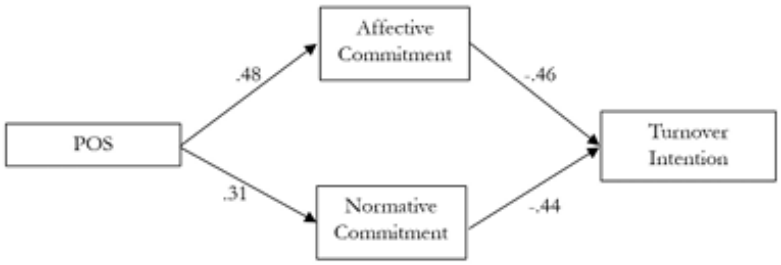


Figure 5 Results from Model 2

Finally, SEM of MODEL 3 fit the data well too: $\chi2(4) = 4.81$, $p = .04$; $\chi2/df = 1.20$; TLI = .99; CFI = .99; RMSEA = .03 (Hu & Bentler, 1999). Results from MODEL 3 are reported in Figure 6.

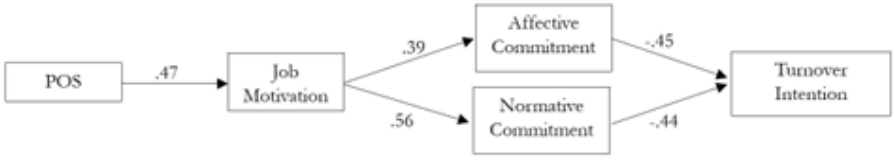


Figure 6 Results from Model 3

The results of mediating relationships are shown in Table 2. The table presents the results of the me diating role of work motivation and organizational commitments (affective and normative) between POS and turnover intention. The confidence intervals in Table 2 indicate the absence of zero in this interval, the overall indirect effect (across two mediators) and also the individual paths. The significance level of the confidence intervals is 95% and the number of samples is 5000 Bootstrap. Overall, the results show that there is no significant direct link between work motivation and turnover intention. In addition, no significant direct relationship was found between POS and turnover intention. While Hypotheses 1 and 3 had already been partially confirmed based on the correlations, Figures 46 show that the SEM results confirmed the hypotheses regarding indirect and mediation pathways. Therefore, Hypotheses 2, 4, 5 and 6 are also confirmed.

Table 2. Bootstrap Results of the Indirect Effects Between POS and Turnover Intention

Independent Variable	Mediator/s	Boot	p.	Confidence intervals (.95)	
				Lower	Upper
POS	Job Motivation (JM)	-.0705	<.001	-.1286	-.0180
POS	Affective Commitment (AC)	-.1017	<.001	-.1544	-.0659
POS	Normative Commitment (NC)	-.0684	<.001	-.1140	-.0364
POS	JM & AC	-.1029	<.001	-.1633	-.0497
POS	JM & NC	-.0840	<.001	-.1449	-.0307
POS	AC & NC	-.1148	<.001	-.1686	-.0725
POS	JM & AC & NC	-.1049	<.001	-.1654	-.0473

Notes. Results are based on 5000 resamples.

DISCUSSION

OUTLINE OF THE RESULTS

The present study examined the indirect associations between POS and turnover intention, consider ing the mediating role of job motivation and organizational commitments, namely affective and normative. The assumption was that the effect of POS on turnover intention could be explained based on three paths (highlighted by the three models), representing indirect effects. The first path (H1-2, Model 1) occurs when POS positively relates to job motivation, indirectly relating to turnover intention. The second path (H3-4, Model 2) concerns the relation between POS and turnover intention via affective and normative commitment. Finally, the third path (H5-6, Model 3) refers to the negative relationship between POS and turnover intention mediated by job motivation and organizational commitment in this order.

Results suggest that when workers and employees perceive the organization to be highly supportive their job motivation to benefit the organization in return increases. Our study found that POS is positively related to job motivation (partially confirming H1), which is consistent with the predictions made by Osman and colleagues (2015). Additionally, the detected negative relationship between job motivation and turnover intention indicates that job motivation leads to lower turnover intention, which is consistent with research results by Gagné and colleagues (2010). Significant correlations between POS and affective commitment and normative commitment were found (partially confirming H3). Thus, our research showed that POS is an important factor associated to positive attitudes towards the

organization. These findings are aligned with Meyer, et al. (1993), who reported a positive correlation between affective commitment and desirable organizational behaviors and a negative one with undesirable behaviors such as turnover intention. Finally, our models confirmed the mediating hypotheses of affective and normative commitment (H4) and job motivation (H2) in the relationship between POS and turnover intention. This, both in Paths 1 and 2, where the mediation effects of job motivation and commitments are separated, and in Path 3, where the model sees the mediation effect go first through job motivation and then through commitments.

The main innovation this research provides is the identification and accurate placement of the variables considered within a functional relationship. Findings on Model 3 showed that job motivation and both commitments mediate the association between POS and turnover intention. The structural equation modelling indices support the arrangement, where job motivation comes first, while affective and normative commitments are placed in the second afterwards. Thus, our proposed model represents a way to explain the underlying mechanism of POS relating to employees' turnover intention by placing job motivation as a first mediator and organizational commitments (affective and normative) as second mediators.

PRACTICAL IMPLICATIONS

The research findings enable organizations to target and intervene more precisely on those factors that, if attended to, can prevent the desire to leave from growing in employees. In fact, the perception of organizational support plays a key role in reducing the effects of turnover intention, in that, through the satisfaction of employees' needs, they will feel greater work motivation, which in turn will directly (or indirectly through higher levels of commitment) result in a lower desire to leave the organization.

As Spector (2003) points out, there are many needs of individuals that, if met, can motivate them to work. Some employees are motivated by tangibles, such as financial support, others by intangibles, such as recognition, development, and social support. Therefore, managers should identify and properly use these variables to create strategies that enable them to support employees in meeting these needs. According to Nwokocha and Iheriohanma (2012), such strategies are based on, among other things, supportive management. Consequently, to increase motivation to work, management in organizations should focus on improving POS by considering the various mediators that can influence the relationship between POS and its consequences.

Furthermore, an organization that responds to the needs of its workers by offering more support may create a sense of obligation to return the favor, leading to high commitment (Allen et al., 2003), which in turn is likely to result in low turnover because of the psychological attachment of commitment that reduces the intention for voluntary turnover (Meyer & Allen, 1997).

Lastly, the model we presented in this study will give a more accurate and specific picture of the relationships between POS and turnover intention to managers and employers. It means that the presence of POS must be maintained to a suitable level in order to produce a proper level of job motivation and, consequently, of affective and normative commitment, which, in this combination, negatively relate and contribute to decreasing turnover intention.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study also has some limitations that must be acknowledged. First, we studied the members of only one industrial company. Furthermore, the lack of information about the gender of the study participants can be a limitation in examining the relationship between perceived organizational support, work motivation, commitment, and intention to leave the workplace. These factors limit the generalization of our results to other samples. Future research could try to replicate our findings with participants from different and wider organizations. Second, given the cross-sectional design of this study, causal relationships among the variables considered cannot be established. Longitudinal studies and further testing are required to verify the causal processes stemming from our model.

It is important to note that common method bias may have influenced the results of this study. Common method bias occurs when a single method of data collection is used, which can lead to artificially inflated correlations between variables. In this study, we used self-report surveys to measure all of the variables, which could have resulted in some degree of common method bias. To address this potential limitation, we recommend using multiple methods of data collection in future research to increase the validity of the reported correlations and ensure that they reflect the true relationships among the investigated variables. Future research could consider linking employees' self-reported measures with objective data concerning turnover rates.

Finally, it is possible that further future research will consider an alternative model in which the order of the mediators present in Model 3 is reversed. In this alternative model, the mediating effect of one of the variables on the relationship between POS and turnover intention could be examined before the mediating effect of the other variable. This could help clarify the issue of complementarity between the two mediating variables.

In the absence of evidence from the literature, this alternative model could be used to explore whether the order in which the mediating variables operate has an impact on the overall relationship between the independent and dependent variables. This could provide insights into the mechanisms through which the mediating variables operate and whether their effects are complementary or independent of each other. Overall, this approach could help deepen the understanding of the relationships between these variables and inform the development of more comprehensive and nuanced models of their relationships.

REFERENCES

Abou-Moghli, A. (2015). The Role of Organizational Support in Improving Employees Performance. International Business Research, 8, 198-203. https://doi.org/10.5539/ibr.v8n2p198

Albalawi, A. S., Naugton, S., Elayan, M. B., & Sleimi, M. T. (2019). Perceived organizational support, alternative job opportunity, organizational commitment, job satisfaction and turnover intention: A moderated-mediated model. Organizacija, 52, 310-324. https://doi.org/10.2478/orga-2019-0019

Allen, D. G., Shore, L. M., & Griffeth, R. W. (2003). The role of perceived organizational support and support ive human resource practices in the turnover process. Journal of Management, 29, 99-118. https://doi.org/10.1177/014920630302900107

Ambrose, M. L., & Schminke, M. (2003). Organization structure as a moderator of the relationship between procedural justice, interactional justice, perceived organizational support, and supervisory trust. Journal of Applied Psychology, 88, 295-305. https://doi.org/10.1037/0021-9010.88.2.295

Anvari, R., JianFu, Z., & Chermahini, S. H. (2014). Effective strategy for solving voluntary turnover problem among employees. Procedia-Social and Behavioral Sciences, 129, 186-190.

Aubé, C., Rousseau, V., & Morin, E. M. (2007). Perceived organizational support and organizational commitment. The moderating effect of locus of control and work autonomy. Journal of Managerial Psychology, 22, 479-495. https://doi.org/10.1108/02683940710757209

Battistelli, A., Galletta, M., Portoghese, I., & Vandenberghe, C. (2013). Mindsets of commitment and motivation: Interrelationships and contribution to work outcomes. The Journal of Psychology, 147, 17-48. https://doi.org/10.1080/00223980.2012.668146

Blau, P. M. (1964). Exchange and power in social life. Wiley.

Bonenberger, M., Aikins, M., Akweongo, P., & Wyss, K. (2014). The effects of health worker motivation and job satisfaction on turnover intention in Ghana: A cross-sectional study. Human Resources for Health, 12, 43. https://doi.org/10.1186/1478-4491-12-43

Brislin, R. W. (1970). Back-translation for cross-cultural research. Journal of Cross-Cultural Psychology, 1, 185-216. https://doi.org/10.1177/135910457000100301

Brunetto, Y., Teo, S. T. T., Shacklock, K., & Farr-Wharton, R. (2012). Emotional intelligence, job satisfaction, well-being and engagement: Explaining organizational commitment and turnover intentions in policing. Human Resource Management Journal, 22, 428-441. https://doi.org/10.1111/j.1748-8583.2012.00198.x

Chang, H. T., Chi, N. W., & Miao, M. H. (2007). Testing the relationship between three-component organizational/occupational commitment and organizational/occupational turnover intention using a non-recursive model, Journal of Vocational Behavior, 70, 352-368. https://doi.org/10.1016/j.jvb.2006.10.001

Chang, W. J. A., Wang, Y. S., & Huang, T. C. (2013). Work design–related antecedents of turnover intention: A multilevel approach. Human Resource Management, 52, 1-26. https://doi.org/10.1002/hrm.21515

Chen, Z., Eisenberger, R., Johnson, K. M., Sucharski, I. L., & Aselage, J. (2009). Perceived organizational support and extra-role performance: Which leads to which? The Journal of Social Psychology, 149, 119-124. https://doi.org/10.3200/socp.149.1.119-124

Cohen, G., Blake, R. S., & Goodman, D. (2015). Does turnover intention matter? Evaluating the usefulness of turnover intention rate as a predictor of actual turnover rate. Review of Public Personnel Administration, 36, 240-263. https://doi.org/10.1177/0734371x15581850

Costantini, A., Ceschi, A., Viragos, A., De Paola, F., & Sartori, R. (2019). The role of a new strength-based intervention on organization-based self-esteem and work engagement: A three-wave intervention study. Journal of Workplace Learning, 31, 194-206. https://doi.org/10.1108/jwl-07-2018-0091

Costantini, A., Dickert, S., Ceschi, A., & Sartori, R. (2018). Psychological processes underlying organizational reward management: The role of perceived organizational support and effort–reward management. In S. J. Perkins (Ed.), The routledge companion to reward management (pp. 25-33). Routledge. https://doi.org/10.4324/9781315231709-5

Darolia, C. R., Kumari, P., & Darolia, S. (2010). Perceived organizational support, work motivation, and organizational commitment as determinants of job performance. Journal of the Indian Academy of Applied Psychology, 36, 69-78. https://doi.org/10.1037/e635812009-001

Dawley, D., Houghton, J. D., & Bucklew, N. S. (2010). Perceived organizational support and turnover intention: The mediating effects of personal sacrifice and job fit. The Journal of Social Psychology, 150, 238-257. https://doi.org/10.1080/00224540903365463

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. Canadian Psychology/Psychologie canadienne, 49, 182-185. https://doi.org/10.1037/a0012801

De Winne, S., Marescaux, E., Sels, L., & Van Beveren, I. (2018). The impact of employee turnover and turnover volatility on labor productivity: A flexible non-linear approach. The International Journal of

Human Resource Management, 30, 1-31. https://doi.org/10.1080/09585192.2018.1449129

Eisenberger, R., Cummings, J., Armeli, S., & Lynch, P. (1997). Perceived organizational support, discretionary treatment, and job satisfaction. Journal of Applied Psychology, 82, 812-820. https://doi.org/10.1037/00219010.82.5.812

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. Journal of Applied Psychology, 71, 500-507. https://doi.org/10.1037/0021-9010.71.3.500

Fitria, Y., & Linda, M. R. (2019, May). Perceived organizational support and work life balance on employee turnover intention. In 1st International Conference on Economics, Business, Entrepreneurship, and Finance (ICEBEF 2018) (pp. 503-506). Atlantis Press. https://doi.org/10.2991/icebef-18.2019.107

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. Journal of Organizational Behavior, 26, 331-362. https://doi.org/10.1002/job.322

Gagné, M., Forest, J., Gilbert, M.-H., Aubé, C., Morin, E., & Malorni, A. (2010). The motivation at work scale: Validation evidence in two languages. Educational and Psychological Measurement, 70, 628-646. https://doi.org/10.1177/0013164409355698

Galletta, M., Portoghese, I., & Battistelli, A. (2011). Intrinsic motivation, job autonomy and turnover intention in the Italian healthcare: The mediating role of affective commitment. Journal of Management Research, 3(2). https://doi.org/10.5296/jmr.v3i2.619

Gambino, K. M. (2010). Motivation for entry, occupational commitment, and intent to remain: A survey regarding registered nurse retention. Journal of Advanced Nursing, 66, 2532-2541. https://doi.org/10.1111/j.1365-2648.2010.05426.x

Gillet, N., Huart, I., Colombat, P., & Fouquereau, E. (2013). Perceived organizational support, motivation, and engagement among police officers. Professional Psychology: Research and Practice, 44, 46-55. https://doi.org/10.1037/a0030066

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. American Sociological Review, 25, 161178. https://doi.org/10.2307/2092623

Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: Update, moderator tests, and research implications for the next millennium. Journal of Management, 26, 463-488. https://doi.org/10.1177/014920630002600305

Harris, K. J., Kacmar, K. M., & Witt, L. A. (2005). An examination of the curvilinear relationship between leader-member exchange and intent to turnover. Journal of Organizational Behavior, 26, 363-378. https://doi.org/10.1002/job.314

Hayes, A. F. (2015). An index and test of linear moderated mediation. Multivariate Behavioral Research, 50, 1-22. https://doi.org/10.1080/00273171.2014.962683

Hochwarter, W. A., Kacmar, C., Perrewé, P. L., & Johnson, D. (2003). Perceived organizational support as a mediator of the relationship between politics perceptions and work outcomes. Journal of Vocational Behavior, 63, 438-456. https://doi.org/10.1016/s0001-8791(02)00048-9

Hom, P. W., Caranikas-Walker, F., & Prussia, G. E., & Griffeth, R. W. (1992). A meta-analytical structural equations analysis of a model of employee turnover. Journal of Applied Psychology, 77, 890-909. https://doi.org/10.1037/0021-9010.77.6.890

Hom, P. W., & Kinicki, A. J. (2001). Toward a greater understanding of how dissatisfaction drives employee turnover. The Academy of Management Journal, 44, 975-987. https://doi.org/10.2307/3069441

Hom, P. W., Griffeth, R. W., & Sellaro, C. L. (1984). The validity of Mobley's (1977) model of employee turnover. Organizational Behavior and Human Performance, 34, 141-174. https://doi.org/10.1016/00305073(84)90001-1

Houkes, I., Janssen, P. P. M., de Jonge, J., & Bakker, A. B. (2003). Specific determinants of intrinsic work motivation, emotional exhaustion, and turnover intention: A multisample longitudinal study. Journal of Occupational and Organizational Psychology, 76, 427-450. https://doi.org/10.1348/096317903322591578

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6, 1–55. https://doi.org/10.1080/10705519909540118

Jha, S. (2009). Determinants of employee turnover intentions: A review. Management Today, 9, 26-33.

Kottke, J. L., & Sharafinski, C. E. (1988). Measuring perceived supervisory and organizational support. Educational and Psychological Measurement, 48, 1075-1079. https://doi.org/10.1177/0013164488484024

Li, Q., Mohamed, R., Mahomed, A., & Khan, H. (2022). The effect of perceived organizational support and employee care on turnover intention and work engagement: A mediated moderation model using age in the post pandemic period. Sustainability, 14(15), 9125. https://doi.org/10.3390/su14159125

Maan, A. T., Abid, G., Butt, T. H., Ashfaq, F., & Ahmed, S. (2020). Perceived organizational support and job satisfaction: A moderated mediation model of proactive personality and psychological empowerment. Future Business Journal, 6(1), 1-12. https://doi.org/10.1186/s43093-020-00027-8

Maertz, C. P., Griffeth, R. W., Campbell, N. S., & Allen, D. G. (2007). The effects of perceived organizational

support and perceived supervisor support on employee turnover. Journal of Organizational Behavior, 28, 1059-1075. https://doi.org/10.1002/job.472

Maslow, A. H. (1954). The instinctoid nature of basic needs. Journal of Personality, 22, 326-347. https://doi.org/10.1111/j.1467-6494.1954.tb01136.x

Meyer, J. P., & Allen, N. J. (1997). Commitment in the workplace: Theory, research, and application. Sage. https://doi.org/10.4135/9781452231556

Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: Extension and test of a three-component conceptualization. Journal of Applied Psychology, 78, 538-551. https://doi.org/10.1037/0021-9010.78.4.538

Meyer, J. P., Becker, T. E., & Vandenberghe, C. (2004). Employee commitment and motivation: A conceptual analysis and integrative model. Journal of Applied Psychology, 89, 991-1007. https://doi.org/10.1037/00219010.89.6.991

Meyer, J. P., & Herscovitch, L. (2001). Commitment in the workplace: toward a general model. Human Resource Management Review, 11, 299-326. https://doi.org/10.1016/s1053-4822(00)00053-x

Mobley, W. (1977). Intermediate linkages in the relationship between job satisfaction and employee turnover. Journal of Applied Psychology, 62, 237-240. https://doi.org/10.1037/0021-9010.62.2.237

Nazir, S., Shafi, A., Atif, M. M., Qun, W., & Abdullah, S. M. (2019). How organization justice and perceived organizational support facilitate employees' innovative behavior at work. Employee Relations: The International Journal. https://doi.org/10.1108/ER-01-2017-0007

Nwokocha, I., & Iheriohanma, E. B. J. (2012). Emerging trends in employee retention strategies in a globalizing economy: Nigeria in focus. Asian Social Science, 8. https://doi.org/10.5539/ass.v8n10p198

O'Connell, M., & Kung, M. C. (2007). The cost of employee turnover. Industrial Management, 49, 14-19.

Osman, A., Haij-Othman, Y., Solaiman, M., & Sohel, R. S. M. (2015). The influence of job satisfaction, job motivation & perceived organizational support towards organizational citizenship behavior (OCB): A perspective of American-based organization in Kulim, Malaysia. Asian Social Science, 11, 174-182. https://doi.org/10.5539/ass.v11n21p174

Pinder, C. C. (1998). Work motivation in organizational behavior. Prentice Hall.

Rashid, H., & Raja, N. S. (2011). Mediating effect of corporate culture on the relationship of retention factors to organizational commitment. Interdisciplinary Journal of Contemporary Research in Business, 3, 211-225.

Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. Journal of Applied Psychology, 87, 698-714. https://doi.org/10.1037/0021-9010.87.4.698

Ridwan, M., Mulyani, S. R., & Ali, H. (2020). Improving employee performance through perceived organizational support, organizational commitment and organizational citizenship behavior. Systematic Reviews in Pharmacy, 11(12).

Saeed, I., Waseem, M., Sikander, S., & Rizwan, M. (2014). The relationship of turnover intention with job satisfaction, job performance, leader member exchange, emotional intelligence, and organizational commitment. International Journal of Learning and Development, 4, 242-256. https://doi.org/10.5296/ijld.v4i2.6100

Sartori, R., & Ceschi, A. (2013). Assessment and development centers: Judgment biases and risks of using idiographic and nomothetic approaches to collecting information on people to be evaluated and trained in

organizations. Quality and Quantity, 47, 3277-3288. https://doi.org/10.1007/s11135-012-9718-z

Sartori, R., Ceschi, A., Cubico, S., & Favretto, G. (2014). Quality and quantity in the construction and validation

of a psychological test for the assessment and selection of aspiring volunteer rescuers: The action-re search in an Italian health association. Quality and Quantity, 48, 3037-3051. https://doi.org/10.1007/s11135-013-9939-9

Sartori, R., Costantini, A., & Ceschi, A. (2022). Psychological assessment in human resource management: discrepancies between theory and practice and two examples of integration. Personnel Review, 51, 284-298. https://doi.org/10.1108/pr-05-2019-0281

Sartori, R., Costantini, A., Ceschi, A., & Tommasi, F. (2018). How do you manage change in organizations? Training, development, innovation, and their relationships. Frontiers in Psychology | Organizational Psychology, 9, 1-11. https://doi.org/10.3389/fpsyg.2018.00313

Shanock, L. R., & Eisenberger, R. (2006). When supervisors feel supported: Relationships with subordinates' perceived supervisor support, perceived organizational support, and performance. Journal of Applied Psychology, 91, 689-695. https://doi.org/10.1037/0021-9010.91.3.689

Shore, L. M., & Shore, T. H. (1995). Perceived organizational support and organizational justice. In R. Cropanzano, & M. Kacmar (Eds.), Organizational politics, justice and support: Managing the social climate in the workplace (pp. 149-164). Westport, CT: Quorum. https://doi.org/10.1002/job.92

Snodgrass Rangel, V. (2018). A review of the literature on principal turnover. Review of Educational Research, 88(1), 87-124. https://doi.org/10.3102/0034654317743197

Spector, P. E. (2003). Industrial and organizational psychology: Research and practice (3rd ed.). John Wiley & Sons, Inc.

Sull, D., Sull, C., & Zweig, B. (2022). Toxic culture is driving the great resignation. MIT Sloan Management Review, 63(2), 1-9.

Tett, R. P., & Meyer, J. P. (1993). Job satisfaction, organizational commitment, turnover intention, and turnover: path analyses based on meta-analytic findings. Personnel Psychology, 46, 259-293. https://doi.org/10.1111/j.1744-6570.1993.tb00874.x

Tomietto, M., Paro, E., Sartori, R., Maricchio, R., Clarizia, L., De Lucia, P., Pedrinelli, G., & Finos, R. on behalf of PN Nursing Group (2019). Work engagement and perceived work ability: An evidence-based model to enhance nurses' well-being. Journal of Advanced Nursing, 75, 1933-1942. https://doi.org/10.1111/jan.13981

Tomietto, M., Rappagliosi, C. M., Sartori, R., & Battistelli, A. (2015). Newcomer nurses' organisational

socialisation and turnover intention during the first 2 years of employment. Journal of Nursing Management, 23, 851858. https://doi.org/10.1111/jonm.12224

Tommasi, F., Ceschi, A., & Sartori, R. (2020). Viewing meaningful work through the lens of time. Frontiers in Psychology, 11, 585274. https://doi.org/10.3389/fpsyg.2020.585274

Tommasi, F., & Degen, J. L. (2022). Keeping a foot in the door: Neoliberal ideology in subjects who opt out of a corporate career. Human Arenas, 1-20. https://doi.org/10.1007/s42087-022-00279-6

Van Dyk, J., & Coetzee, M. (2012). Retention factors in relation to organizational commitment in medical and information technology services. SA Journal of Human Resource Management, 10. https://doi.org/10.4102/sajhrm.v10i2.433

Wayne, S. J., Shore, L. M., & Liden, R. C. (1997). Perceived organizational support and leader-member exchange: A social exchange perspective. The Academy of Management Journal, 40, 82-111. https://doi.org/10.2307/257021

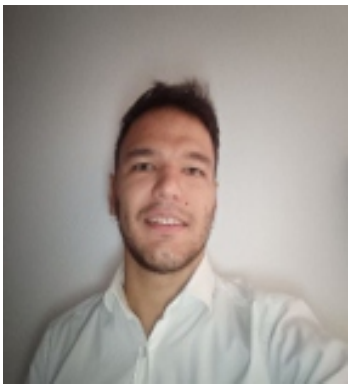
Xiong, R., & Wen, Y. (2020). Employees' turnover intention and behavioral outcomes: The role of work engagement. Social Behavior and Personality, 48, 1-7. https://doi.org/10.2224/sbp.8609

AUTHORS

*R*iccardo Sartori is Associate Professor of Work and Organizational Phycology at the Human Sciences Department of Verona University. He is a psychologist and psychotherapist, graduated in Work and Organizational Psychology, Ph.D in Perception and Psychophysics. His interests focus on 1) Assessment of candidates and personnel (individual, group, and organizational assessment); 2) Training and Development of the Human resources; 3) Business consulting dealing with organizational dynamics (organizational co-habitation, cooperation, conflict etc.). He is the Director of the research center APRESO (Applied Research in Society and Organizations).

Andrea Ceschi is Associate Professor in Work and Organizational chology (WOP) at the Human Sciences Department of Verona University. Co-Founder and Scientific Director of the research center APRESO (Applied Research in Society and Organizations), his expertise lies in organizational behavior, individual differences and decision-making at work, and social dynamics in the applied psychology field.

Mattia Zene is a PhD candidate in Work and Organizational Psychology at the Human Sciences Department of Verona University. He is graduated in Psychology for Training, with a thesis on the effects of smart working over individual outcomes such as performance and exhaustion. He is currently a Research Collaborator at the APRESO research group, where he works on patient engagement research projects in the healthcare field. His research focuses on using psychometric assessment techniques to investigate factors that impact patient engagement.



Lorenzo Scipioni has a master degree in Work and Organizational Psychology. He cooperates as a Research Collaborator with the Department of Human Sciences, Verona University, Italy. His area of interest is in organizational innovation and wellbeing at work.

Michele Monti has a master's degree in Work and Organizational Psychology. He is graduated in Psychology for Training, with a thesis that examined the strategic disclosure in the field of Human Resources. He collaborates as a Communication Assistant with the Verona University Center of Research APRESO. His area of interest is in dissemination and digital communication on the topics of the Work and Organizational Psychology.

Online ISSN: 1521-4672 Print ISSN: 1547-9684

THE PREDATORY JOURNAL: VICTIMIZER OR VICTIM?

T. Grandon Gill
University of South Florida, Tampa, FL, USA

ABSTRACT

Aim/Purpose Labeling a journal as "predatory" can do great damage to the journal and the individuals that have contributed to it. This paper considers whether the predatory classification has outlived its usefulness and what might replace it.

Background With the advent of open access publishing, the term "predatory" has increasingly been used to identify academic journals, conferences, and publishers whose practices are driven by profit or self-interest rather than the advancement of science. Absent clear standards for determining what is predatory and what is not, concerns have been raised about the misuse of the label.

Methodology Mixed methods: A brief review of the literature, some illustrative case studies, and conceptual analysis.

Contribution / Findings The paper provides recommendations for reducing the impact of illegitimate journals. Current predatory classifications are being assigned with little or no systematic research and virtually no accountability. The predatory/not predatory distinction does not accommodate alternative journal missions.

Recommendations for Researchers The distinction between legitimate and illegitimate journals requires consider ation of each journal's mission. To serve as a useful guide, a process akin to that used for accrediting institutions needs to be put in place.

Impact on Society Avoiding unnecessary damage to the careers of researchers starting out.

Future Research Refining the initial classification scheme proposed in the paper.

Keywords predatory journals, peer review, replication, complexity, scientific research

INTRODUCTION

What makes a journal or publisher "predatory"? Since University of Colorado librarian Jeffrey Beall first popularized the term in a 2012 Nature News article, research interest in this question has grown, as illustrated in Figure 1. With the growth in the predatory label's popularity, the number of journals and publishers characterized as "predatory" or "potentially predatory" has grown correspondingly. What is less clear is whether the characterization is always, or even mostly, warranted. Since being classified as predatory does indisputable damage to a journal's reputation and that of the authors that have published in it—often unknowingly—the question posed by this paper is one that should be of great interest to researchers across nearly every discipline.

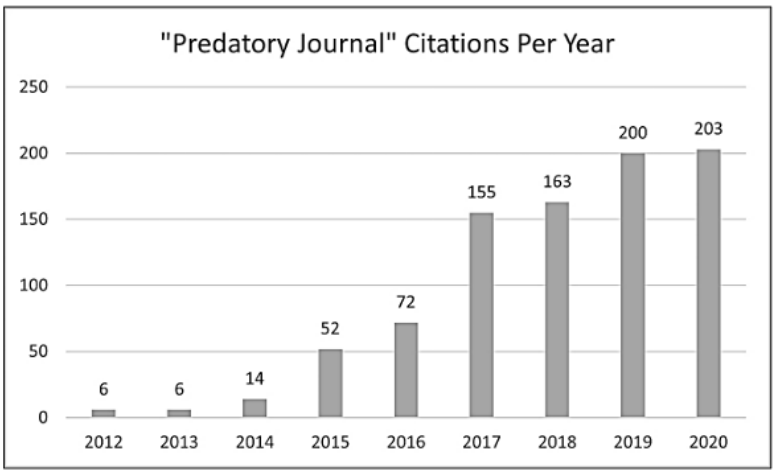


Figure 1: Article counts from Google Scholar search of "predatory journal" compiled using Harzing's "Publish or Perish".

I begin this article with an overview of the rapidly growing body of literature that addresses predatory journals and publishing practices. Of particular interest in this review were the following:

1. The attributes or indicators that cause a journal to be characterized as predatory.
2. The perceived stakeholders that are damaged by predatory journals, with emphasis placed on concrete examples of damage.
3. The domain of concern (e.g., humanities, life sciences, social sciences, etc.), where specified.
4. The geographic region of concern, where specified.
5. The underlying research approach (e.g., empirical, conceptual, opinion).

The review is followed by an analysis of some of the key elements that lead to a journal being placed on a list of predatory journals, as identified in the literature review. Most significant among these publication fees, the peer review process, focus, and quality of the editorial board. In each of these cases, I propose that policies that may be indicative of predatory objectives in one context can represent sensible choices in another context.

To illustrate the challenge of distinguishing what is predatory from what is not, I then present two case studies of organizations that have been tarnished with the "predatory" or "potentially predatory" label. Based on my own observations and experiences, I present the argument that such a label makes little sense. To the contrary, these organizations go to great effort and expense to offer value to the research community through their mentoring activities and the opportunities they provide to researchers with limited access to the resources of the well-funded research-intensive institutions of the Western world. Building upon the cases, I then propose that the predatory/non-predatory classification should be eliminated entirely. Instead, a legitimate/illegitimate distinction would better address the genuine need to identify bad actors in the journal world. I further propose that within the space of legitimate journals, mission-specific categories—such as competitive, exploratory, translational, and developmental—be established. Journals should then be assessed according to the consistency their practices with the mission categories that they have adopted. Such an approach would parallel that used by agencies in accrediting institutions. I conclude the paper with some specific recommendations on how to reduce the damage inflicted by illegitimate journals.

LITERATURE REVIEW

As shown previously in Figure 1, the amount of literature examining the nature and impact of predatory journals is expanding rapidly. In this section, I briefly consider what has been written. I begin by describing the methodology employed, then present a summary of key findings. I conclude the section with proposed approaches to addressing the problem and summarize research expressing concerns about the process through which these so-called predatory journals are currently identified.

METHODOLOGY

In conducting the literature review, my goal was to understand better how the academic community perceived the challenge presented by predatory journals. Given the relatively recent nature of most of the literature (e.g., more than 80% of the articles identified in Figure 1 were published in the past 4 years), seminal contributions could not be identified—aside from Beall's (2012) original one-page article. For that reason, I followed a protocol that seemed likely to yield a relatively broad overview of the perceptions of the research community. The protocol was as follows:

1. All the articles listed in the top 10 pages of a Google Scholar search conducted at the end of December 2020 were identified (100 articles total).
2. Electronic copies of all articles were retrieved, excepting books, articles not accessible through my institution's library, and articles that were clearly not relevant. This process reduced the number to 87 articles.
3. I skimmed each article looking for key elements:

a. What broad area was the article applied to? Examples included life sciences, such as medicine, biology, and nursing (40), library or information science (36), social sciences (7), general research (3), and engineering (1).
b. Was the article tied to a specific locality? 10 articles were tied to a specific region. These included India, Africa, Middle East, Pakistan, and Italy.
c. What stakeholders were potentially damaged by predatory publishing? Examples were authors (35), institutions (17), publishers (7), reviewers (2), and the broader community (1). Nearly half (40) expressed explicit concerns regarding the impact of these journals on the field (i.e., the underlying science) in which they were published, and nearly all appeared to express the concern implicitly.
d. Were empirical findings were presented? Thirty-two articles described empirical research conducted by the authors, usually bibliometric in nature.
e. Was a solution to the problem of predatory publications proposed? 11 articles proposed one or more potential solutions.
f. Were concerns expressed regarding the validity and reliability of how journals were classified? 22 articles expressed concerns about the process, particularly the danger of labeling a legitimate journal as predatory.

4. Results were tabulated in a spreadsheet. An additional column was added for illustrative quotes from each article.

KEY FINDINGS

In analyzing the research literature relating to predatory publishing, a set of commonly discussed themes emerged:

- Indicators of a predatory journal
- Awareness of predatory journals
- Damage inflicted on various stakeholders by predatory journals
- Proposals for reducing predatory publishing
- Reservations relating to the current conceptions of predatory publishing.

These themes are now briefly explored.

Indicators of a predatory journal

The most referenced indicators of a predatory journal are summarized in Table 1. Many of these are also included in a list of criteria for determining predatory open-access publishers developed by Jeffrey Bell (2015a)

Table 1: Common Indicators of a Predatory Journal

Indicator	Description	Illustrative Quotes
Publication Fees	The journal charges a publication fee inconsistent with its costs and may hide the existence of the fee until after an article is accepted.	"Some predatory publishers spam researchers, soliciting manuscripts but failing to mention the required author fee. Later, after the paper is accepted and published, the authors are invoiced for the fees, typically US$1,800. Because the scientists are often asked to sign over their copyright to the work as part of the submission process (against the spirit of open access) they feel unable to withdraw the paper and send it elsewhere." Beall, 2012, p. 179)
Peer Review	Peer review processes are inadequate, not followed or inadequately disclosed.	"Predatory journals have, at last, had the tables turned on them with stings to show their peer review processes are flawed or, more commonly, non-existent. This is critical as too many seem unaware of the lack of peer review and the damage that causes. A particularly classic example, if you can excuse the salty language, is the paper by David Mazieres and Eddie Kohler published in the journal International Journal of Advanced Computer Technology and entitled 'Get me off your f****** mailing list.' That particular paper literally consisted of nothing more than repeating the text of the article's title, including the expletive, hundreds of times. The manuscript was accepted for publication." (Roberts, 2016b, p. 619)
Speed of Publication	Very rapid submission to publication times experienced or advertised.	"Predatory journals may seem attractive, with their scaled-down publication times (in return for payment), but are really not to be recommended: such speedy treatment does not allow time for proper reviewing, and there is little assurance that the publication will stay in the scientific field for very long." (Laccourreye et al., 2018; p. 39)
Failure to Follow Publishing and Preservation Standards	Journals do not assign DOIs to articles and fail to ensure they are archived for future readers.	"Few predatory publishers practice digital preservation according to established standards, and fewer, I think, even know what it is. I suspect that few back up their content, and I have documented cases of publishers disappearing from the Internet, their content forever lost." (Beall, 2015b; p. 474-475)

Inadequate Quality Control	Articles were published with significant grammatical and spelling errors that should have been caught with rudimentary proofing.	"Two hundred thirty-three articles (65.6%) had documented errors in writing and included all the errors on the review form, plus others such as the use of colloquial language, overuse of abbreviations, incomplete sentences, and awkward phrasing. The obvious inadequate use of the English language is one red flag that should alert readers to the fact that many of the articles in predatory journals are not suitable as citations or as evidence to guide practice. Many of the articles that reflected inadequate English were by authors for whom English is likely a second language. However, blatant grammatical problems also occurred in articles from English-language countries written by authors with Eurocentric names. Although perfection in publication is an elusive goal, there should be processes in place, including copyediting, that ensures that the final published article is factually correct and professionally presented." (Oermann et al., 2018, p. 9)
Inadequate Verification of Submission Authenticity	Failure to take basic steps to prevent plagiarism and misattribution.	"We discovered one journal that published plagiarized content from another and vice versa. This was identified by a member of the review team who found one article to be very similar to an article already reviewed. Further investigation (reading the articles side by side) revealed that the title was modified, different authors were listed, and the location and affiliation of the authors were changed. The first and second sentences of the abstract and of the article were slightly rewritten, but beyond that, the rest of the text was identical. This prompted us to rereview the randomly selected articles from the two journals wherein it was found that all the content was plagiarized in this way. A spot check of additional articles in the journals suggested that they contained 100% plagiarized content, which between them accounted for 163 published articles. Interestingly, these journals were published by different publishers. Both journals have names that are similar to the titles of legitimate, nonpredatory journals— in one case, the name varies by only one letter, creating an additional layer of confusion for a reader." (Oermann et al., 2018, p. 9)
Failure to Safeguard Intellection Property	Reviewers or editors take authors ideas and use them without proper attribution and may even interfere with a manuscript's publication for their personal benefit.	"A study conducted by Resnik et al. reported unethical and unfortunate evidences [sic] of predatory reviewers stealing original authors' ideas and purposely delaying their publications. It was reported that among study participants including researchers, research staff, postdoctoral trainees, and technicians working at the National Institute of Environmental Health Sciences, 6.8% of the respondents reported experiencing predatory reviewers breaching the confidentiality of their manuscript submission, they also reported that predatory reviewers unethically used their ideas or data without their will and permission to gain personal benefits. About 9.2% respondents claimed that reviewers unethically delayed their review process so that he or she could publish their own research on the same topic with similar idea or even may reject manuscript that carries major advances and innovations." (Sharma & Verma, 2018; p. 228)
Falsified Editorial Board	To increase their credibility, journals list well-known scholars on their board without permission.	"I also get e-mails from the predators' victims. Some have been named as members of editorial boards without their knowledge or permission." (Beall, 2012, p. 179) "Still other reputable individuals have found their names listed on journal Web sites, without their permission or knowledge, as members of bogus editorial boards." (Nahai, 2015, p. 1042)

plagiarized work. For example, Retraction Watch (2013) reports that in a single year, both the Journal of Business Ethics and the Journal of Academic and Business Ethics had to retract articles where blatant plagiarism was detected. The process of preparing publications for third-party archiving can be challenging. Ensuring all peer reviews are done at a high level requires continuous monitoring and mentoring of the activities of volunteers who may be receiving little or no credit for their efforts. A publisher is unlikely to have much control over a reviewer's decision to steal another author's work; what the publisher can control is the actions taken upon detecting such an incident. Getting articles professionally proofed can be expensive, while requiring editors to perform that task often results errors slipping through. The careful reader will notice that even among the direct quotes from the research gathered for this article, several grammatical errors were detected (indicated by [sic]).

Publication fees, also known as article processing charges (APC), present a particularly ambiguous case. These charges can be an important source of operating revenue for open access journals that neither charge libraries nor individuals for their publications. Many of the articles examined for this study presume that acquiring these fees is the principal motivation for predatory practices. For example:

Predatory journals recruit articles through aggressive marketing and spam emails, promising quick review and open access publication for a price. There is little if any quality control and virtually no transparency about processes and fees. Their motive is financial gain, and they are corrupting the communication of science. (Clark & Smith, 2015, p. 1)

The situation is not so black and white, however. Many well respected, widely read journals such as Science and Nature charge fees in the thousands of US dollars, with an additional charge if authors choose to have their work published open access. An empirical study of open access journals found that the mean APC charged by journals in the Directory of Open Access Journals (DOAJ) was around $900-$1000 USD (Shen, & Björk, 2015, p. 13). Indeed, when examining whether to an APC for its journals several years ago, the Informing Science Institute was advised by a well-respected librarian that the institute would lack credibility if they did not initiate a publication fee.

The irony here is that the research literature appears to be more concerned about APCs that are too low than APCs that are too high. For example:

Finally, authors should be cautious when the listed APC of a biomedical journal is under $150 USD. This is very low in comparison to presumed legitimate, fully open access biomedical journals for which the median APC is at least 18 times more ... extremely low APCs may simply be a way for potential predatory journals to attract as many submissions as possible in order to generate revenue and presumably to build their content and reputation. (Shamseer et al., 2017, p. 11).

The APCs by predators are, nevertheless, much lower than the APCs by more credible OA publishers, which on the other hand often offer waivers from the charges to authors from developing countries. (Shen, & Björk, 2015, p. 13).

By charging low fees, however, the economic motivation to engage in predatory practices seems quite low. For example, one study of Indian open access journals found that the median annual revenue garnered from publication fees (computed by multiplying the published fee by the number of publications) was $2752 USD (Xia, 2015, p. 73).

Awareness of predatory journals

A frequently stated concern in the literature was that authors and institutions might not be aware of the predatory nature of the journals they submit to or publish in. Some quotes from the articles illustrate this from both the empirical and personal perspective:

Young researchers are inexperienced in the process of publishing and therefore unaware of predatory journals. In this situation, companies publishing predatory journals offer the young scientists, who are often frustrated by a series of rejections, rapid peer review processes and publication times. (Richtig et al., 2018, p. 1447)

We surveyed participants of writing workshops at veterinary and medical schools and an international conference over a 1-year period. ... Of the 142 respondents who answered, 33 (23.0%) indicated awareness of the term "predatory journal"; 34 (23.9%) were aware of the Directory of Open Access Journals; 24 (16.9%) were aware of the Science "sting" article about predatory journals; and 7 (4.8%) were aware of Beall's list. Most (93/144, 64.5%) definitions of predatory journals described poor but not predatory journal practices, and some respondents misunderstood the term completely. Mentors should help novice authors to be aware of predatory journals and to distinguish between legitimate and illegitimate open-access journals, thus selecting the best journal for their work. (Christopher & Young, 2015, p. 1)

My first paper was published in December 2014 in a predatory journal without my approval. Although the journal was very new, it claimed to be an international, open access journal with a high impact factor, broad indexing, and a rigorous peer review. The title of published in that journal was "Perceptions, practices, and use of Facebook: a cross-sectional survey on physiotherapy students in Pakistan." Within 2 weeks of submission, the reviewer's comments were received, which did not add anything to improve the content of the manuscript, and the article was accepted with an invoice for article processing charges. I did not agree to pay anything to the journal (since the fee was not disclosed ahead of time), nor did I sign a copyright agreement with them. Being unaware of this phenomenon, I was duped at the beginning of my publishing career, and the paper was published in the predatory journal without my consent. (Memon, 2018, p. 146)

What is not discussed at length in the literature is the authors' responsibility to objectively assess the quality of the process after a manuscript is submitted. In the third quote, for example, precisely what happened is a bit vague. The author reports getting back entirely useless peer reviews in two weeks along with an invoice for a previously undisclosed APC. All of these suggest a "textbook" predatory journal, a fact that the author apparently recognized. What is unstated is if the author actually paid the APC. If so, then the author bears some responsibility for the publication since many red flags were ignored. If not, by publishing an article without receiving an APC, the journal operated in atypical way if its motivation was purely economic. In either case, the journal was almost certainly predatory (as we understand the term). In the case where it went ahead and published the without the author's permission and without holding the copyright, it was also guilty of a criminal violation of intellectual property law. Unfortunately, where organizations are willing to engage in criminal conduct, addressing the problem through regulations, requiring transparency, and demanding accepted practices may have little effect. Criminals have little problem with using deception, anonymity, and international borders to shield their activities.

Damage inflicted to stakeholders

The question of pre-existing awareness of predatory journals is important because of the potential damage and penalties that publication in predatory journals can inflict. Examples of concerns expressed in the literature for different stakeholders are presented in Table 2.

In considering these findings, it is worth pointing out that much of the damage described in the literature—particularly as it applies to authors, reviewers, and institutions—stems from association with a journal labeled as predatory. It is the label, rather than the underlying content of the paper, that does the damage. The difficulty this presents is that of Type 1 error: a journal or publisher mistakenly classified as predatory when, in fact, it is not.

Table 2: Examples of Stakeholders Damaged by Predatory Publishing

Stakeholder	Description	Illustrative Quotes
Field of Study	General damage inflicted on science	"Predatory journals threaten science, scientists and the effective communication of science." (Beall, 2016, p. 78) "Predatory publishers are thus undermining the core business of generating evidence to improve global health. The journals also pollute the evidence base on which clinical practice and public health policy depend, and, as Beall points out, the weak or absent review systems mean that predatory journals can be 'reservoirs of author misconduct,' including plagiarism, falsified data, and image manipulation." (Clark & Smith, 2015, p. 1) "Predatory journals challenge the establish [sic] regime of academic knowledge production from the inside." (Dobusch & Heimstädt, 2019, p. 616) "Entire fields of scientific research are now be [sic] susceptible to a pollution of the literature by unverified research or even fake articles published in fake journals being incorporated into legitimate meta-analyses. All that is needed is for a careless author of a review article, or a meta-analysis, to cite one of these articles from a predatory journal to create a distortion to the published record and, thus, potentially cause future misdirection of research." (Roberts. 2016a, p. 1831)
Authors	Loss of reputation, position or status as a result of publishing in a predatory journal	"By publishing in a predatory journal, researchers immediately render their work unusable, illegitimate, and stigmatized. Funders will not recognize the publication and there is a risk reputations can be tainted by association with such an untrustworthy publication." (Roberts, 2016a, p. 1831) "Unfortunately however, naive authors may not appreciate the negative consequences of publishing their research findings in predatory journals, such consequences may include loss of the manuscript, 'negative scars" in their publication records, career damage, lost or disappearance of predatory journals altogether." (Al-Khatib, 2016; p. 282) "Increased attention should be paid as to where papers have been published. A publication in a predatory journal might not be neutral on a CV and might even be an active demerit that harms the reputation of everyone, especially young scientists, listed on the article." (Richtig et al., p. 1447)
Publishers	Legitimacy of scientific publishing is called into question	"Predatory journals threaten the integrity of the scientific system by undermining the aims of open access, creating confusion around those journals that operate ethically under the APC model. They harm the reputation of reviewers and editors whose names they include without permission, of authors, mainly inexperienced ones, that publish their work in them out of ignorance, and of journals that start their trajectory with this model but are not yet established enough to be indexed in prestigious databases." (Abad-Garcia, 2019, p. 56.e5)

Community	Non-academics who might be impacted by research	"When 'Jane' turned to alternative medicine, she had already exhausted radiotherapy, chemotherapy and other standard treatments for breast cancer. Her alternative-medicine practitioner shared an article about a therapy involving vitamin infusions. To her and her practitioner, it seemed to be authentic grounds for hope. But when Jane showed the article to her son-in-law (one of the authors of this Comment), he realized it came from a predatory journal — meaning its promise was doubtful and its validity unlikely to have been vetted." (Grudniewicz et al., 2019 p. 210)
Reviewers	Collateral damage to a reviewer's career by being affiliated with predatory journal.	"Being asked to serve on an editorial board or as an editor of a journal is a recognition of one's expertise; however, before accepting any invitation, it is critical to assess the quality of the journal, as serving in the editorial board of PJ [predatory journal] is useless as well as detrimental to the researcher's career." (Forereo et al., 2018, p. 586)
Institutions	Failure to properly assess faculty contributions leading to invalid hiring, promotion and tenure decisions	"The professor was awarded tenure in the spring semester. No one noticed the fact that all 15 of the articles listed in his application appeared in "pay-to-publish" journals—publication outlets that masquerade as serious, legitimate scholarly periodicals but in reality are mostly financial scams. In short, the professor had bought his way to tenure." (McLeod et al., 2018, p. 121) "Undeserved promotion of faculty, on the grounds of publications in predatory journals, will also discourage genuine ones who are sincerely working for making impactful contributions. This will contribute to increased job dissatisfaction and more brain drain from developing countries. Moreover, academics promoted on the grounds of publication in predatory journals end up being assigned administrative and academic positions where they will be dealing with complex issues without having the necessary experiences and intellectual capacity, further contributing to declining excellence. Such professors are wittily dubbed 'zombie professors' in many countries in Africa, implying that they are professors only in their titles and not in intellectual status and contributions." (Balehegn, 2017, p. 98) "I think that, since the advent of predatory publishing, there have been tens of thousands of researchers who have earned Masters and Ph.D. degrees, been awarded other credentials and certifications, received tenure and promotion, and gotten employment – that they otherwise would not have been able to achieve – all because of the easy article acceptance that the pay-to-publish journals offer." (Beall, 2017, p. 275)

Proposals for addressing predatory publishing

A variety of solutions have been proposed to address the problem of predatory journals. To the extent that concerns arise from the label, one recommendation is to abandon the label altogether. For example:

A potential solution to reduce the publisher or perish pressure (and, relatedly, the shortcut through predatory journals) may exist at the institutional level: the San Francisco Declaration on Research Assessment (DORA) developed in 2012, aims to improve the ways in which the outputs of scholars are evaluated. The DORA recommendations include ground-breaking concepts:

(1) Journal-based metrics should not be used as measure of the quality of individual research articles to assess an individual scientist's contributions, or in hiring, promotion, or funding.
(2) Especially for early-stage researchers, the scientific content of an article is much more important than publication metrics or the identity/standings of the journal in which it was published. To date 1553 organizations and 15,006 individuals signed the DORA. (Cortegiani et al., 2020, p. 195)

Some additional proposed solutions are summarized in Table 3.

Table 3: Examples of Proposed Approaches for Addressing Predatory Journals

Solution	Description	Comment
Retraction Letters	Provide a mechanism whereby authors who discover they have appeared in predatory journals to publicly retract their article if the journal refuses to do so.	"Predatory journals will usually not be willing to retract papers, or might ask for 'retraction fees.' Even when a retraction is denied, authors can upload the retraction letters attached to their papers on institutional or personal archiving services, such as Google scholar citation page, Research Gate, and Academia, etc. This will be viewed as an ultimate display of commitment to science, quality, and professionalism on the part of the author and the institution." (Balehegn, 2017, p. 99)
Rating System	Rather than a simple predatory/non-predatory distinction, provide a system of points that assesses the degree to which a journal has predatory features.	"We introduce a new metric, the Predatory Rate, PR, for ranking journals. This metric helps us to do judgment about predatory journals and let editors to evaluate their journals against predatory practices. Academic databases could use this metric to indicate the journal predatory rate in their evaluation process. According this metric, journals would be classified in three groups as follows: predatory journals, journal with predatory practice, and non-predatory ones, also in order to help a journal with predatory practice to be converted to a non-predatory one." (Dadkhah & Bianciardi, 2016, p. 4)
Predatory List Committee	A committee assesses journals and keeps the list updated. A similar proposal involves establishing a global collective to oppose predatory journals.	"Kscien has recruited a special committee consisting of 23 young researchers under the title of (Predatory List Committee (PLC)). The members were trained and passed through several specified workshops to expand their knowledge regarding predatory journals and publishers. They are working unceasingly to keep the list refurbished, expose current tricks invented by the predators and guide authors. The list is designed to be updated daily." (Kakamad et al., 2019, p. 6) "A global collective effort to protect authors from predatory journals and publishers" (Al-Khatib, 2016; p. 282)
Open Peer Review	By making peer review more open and posting reviews and comments publicly, the quality of a journals processes becomes more transparent.	"The rise of predatory publishing should be a trigger to experiment with more open forms of peer review. OPR practice can not only curb predatory journals but also can lead to more rigorous (through dialogue within the academic community) and relevant (through dialogue with other interested parties) management research." (Dobusch & Heimstädt, 2019, p. 616)
Web Page Feedback	An application that provides feedback to potential authors on each journal's web page; feedback would be determined by a committee of stakeholders.	"We envision a plug-in tool that researchers could click to get immediate feedback about a journal page they are visiting and whether it has characteristics of predatory journals. This feedback could provide them with the relevant information to determine if the journal suits their needs and/or meets any policy requirements to which they must adhere (e.g., digital preservation, indexing)." (Cobey et al., 2018, p. 15)

Reservations regarding the predatory journal label

Over a quarter of the articles surveyed expressed significant reservations about the predatory journal label. These concerns tended to fall into two broad categories: concerns about the label itself and concerns about how lists of such journals were constructed.

With respect to the limitations of the predatory label, one article summarized these as follows:

Key points

• The term 'predatory journal' hides a wide range of scholarly publishing misconduct.

• The term 'predatory journal' unhelpfully bundles misconduct with poor quality.
• The term 'predatory journal' blinds us to important possibilities, needs, and questions arising in the developing scholarly landscape.
• The current scholarly publishing environment cannot rely on such a simplified classification of journals into predatory or not. (Eriksson & Helgesson, 2018, p. 181)

On the issue of the range of misconduct, it must be recognized that many of the sins attributed to predatory journals—such as plagiarism, theft of ideas, and falsification of results—are, in fact, committed by authors or reviewers. They sometimes impact even the most reputable journals. Consider the following quote:

Predatory journals also can be abused to hide potential conflict of interests: a very famous case – although not published in a predatory journal – was the case of Wakefield in the Lancet. This case demonstrates how one falsified study can continue to have tremendous effects on public health for decades. In his work, Wakefield linked the MMR vaccine with autism in children, which later was proven to be a false claim and led to the retraction of the article in 2004. However, the retracted articles still get continuously cited, although its claims have been proven wrong. (Richtig et al., 2018, p. 1447)

In the entire body of predatory publishing literature that I examined this is the most concrete example of damage caused by invalid research. Ironically, the authors used it to illustrate one of the dangers presented by predatory journals despite the fact that (a) the fraudulent nature of the submission would have likely eluded the attention of almost any reviewer, and (b) the impact of the article on the community was almost certainly driven by the prestige of the Lancet.

For other predatory behaviors, such as intentionally hiding APCs and listing board member without permission, journals and publishers must clearly be held accountable. This leads us to the item, bundling misconduct with poor quality. Unfortunately, objective measures of article quality are limited and may vary considerably across disciplines. What might be viewed as ludicrous junk science in one discipline could be hailed as solid postmodern research in another. It seems unlikely that a binary choice of predatory/non-predatory distinction can capture the variation between journals and disciplines, which is the basis of Eriksson & Helgesson's (2018) fourth point.

With respect to the process through which predatory journal/publisher lists are constructed, serious concerns have been raised. Many researchers have complained about Beall's list, which has been characterized as being instrumental in the fight against predatory journals (Strielkowski, 2017, p. 416). These involved both the criteria used (e.g., see Beall, 2015a) and transparency. For example:

The effort involved in developing Beall's list was impressive and it was a reasonable starting point for someone who wanted to investigate a journal's or publisher's authenticity. However, Beall did not list the specific criteria he used to categorize a given journal as predatory and he mistakenly black-listed some legitimate journals and publishers, particularly those from low and middle income countries (LMICs). (Laine & Winkler, 2017, p. 287)

Like Batman, Beall is mistrusted by many of those he aims to protect. "What he's doing is extremely valuable," says Paul Ginsparg, a physicist at Cornell University who founded arXiv, the preprint server that has become a key publishing platform for many areas of physics. "But he's a little bit too trigger-happy." (Bohannon, 2013, p. 62)

Beall's list was not objective and that his criteria for including journals were not transparent.(Das & Chatterjee, 2018, p. 198)

There were also complaints that Beall's list was biased in its focus on open access journals. For example: Any list such as Beall's will have both type I errors (journals being wrongly included) and type II errors (journals being wrongly excluded). However, for this research, Beall's focus on open access journals also creates an additional potential bias. Other publishers may follow similar practices but be protected from scrutiny by pay walls. Thus, relying on Beall's list may result in undercounting of articles in journals with predatory practices. (Pyne, 2017, p. 143) This study demonstrates the subjective nature of the Criteria by which Beall constructs his lists. Furthermore, it highlights the finding that well-regarded academic journals, whether OA or not, can be considered as possible predatory journals, even when LIS professionals apply the Criteria. (Olivarez et al., 2018, p. 62)

Finally, the fairness of the list, and the process by which the list could be modified, is questioned. For example:

It seems that the objective of the Beall's list is to make the list larger, however there should be a (real) chance to remove items. The way Jeffrey Beall was the "judge jury and executioner" in his 'verdict' on whether a journal or publisher is (potentially) predatory has been questioned on several occasions (Keller, 2019, p. 20)

The last of these issues has become particularly problematic in recent years. In early 2017, Jeffrey Beall discontinued his blog and stopped updating his list. Another individual, who has chosen to remain anonymous, took over the list and continues to update it as of the time of this writing. That website describes the author as follows:

I am not Jeffrey Beall. I prefer my identity to be anonymous, largely for the reasons that Beall mentioned in his recent article. … However, I can tell you that I am a postdoctoral researcher in one of the European universities and have hands-on experience with predatory journals.

I will keep the list updated as much as possible, although I suspect I simply won't have time to do as thorough job as Beall. Hopefully, people will point me to the new, possibly predatory journals and publishers. However, expect the list's applicability to diminish over time. That is why I strongly suggest anyone that deals with publishing academic articles to read the information available on ThinkCheckSubmit.org, which has tips about how to publish in a journal that is not predatory. I would also suggest you read Beall's criteria for identifying a predatory publisher.

The upshot of this is that lacking transparent mechanisms to ensure the accuracy of the list, journals or publishers placed on the list have no way to defend themselves.

CASE STUDIES

In this section, I present two case studies—one a publisher, one a journal—that ended up on the anonymous copycat version of Beall's list.

INFORMING SCIENCE INSTITUTE

The Informing Science Institute was established in 1998 to serve as a community of researchers seeking to share ideas about information systems across disciplines that have traditionally operated in silos. Its philosophy was expounded in an article written by Eli Cohen (1999) titled "Conceptualizing Information Systems as a Field of the Discipline Informing Science: From Ugly Duckling to Swan". Its origins and history are described in a research article (Murphy, 2020) and a case study (Koch & Johnson, 2018).

About the Informing Science Institute

The institute's philosophy and research focus are described on the institute's website as follows (Informing Science Institute, 2021):

Informing Science Institute Philosophy

The Informing Science Institute is a mentoring organization. One of the Informing Science Institute's core principles is helping our fellow colleagues to become better and better: better as an author, as a reviewer, as an editor, and as an editor-in-chief. We use the peer review process of our journals to support author colleagues by providing them with constructive suggestions on ways to improve their work even if a submitted article is not accepted for publication. Our Editors-in-Chief assist reviewers and editors by being coaches and guides to the authors, reviewers, and editors.

ISI Research Topics

ISI encourages the sharing of knowledge and collaboration among the wide variety of fields, often using information technology to advance the multidisciplinary study of informing science. These areas can include Business, Communications, Communicating Meaning, Community and Society, Computer Science, Data Management, Distance Education, eCommerce, Education, eLearning, Government, Health Care, History, Information and Library Science, Journalism, Justice and Law, Mathematics, Management, Philosophical Issues, Psychology, Public Policy, Sociology, and Human Resources.

In the more than two decades since the institute was established, it has grown to publish 14 journals (including several partner journals). As of 2020, it had published "more than 4100 articles by over 4500 authors from over 600 universities" (Murphy, 2020, p. 165). Its constituency is highly global, as illustrated in Figure 2.

Beyond its publishing activities, the institute was also dissatisfied with available options for managing the peer-review process. While both open source and commercial tools could accept submissions and manage review assignments, they lacked key capabilities that the institute wanted for its mentoring missions. Consistent with its stated mission, it felt that the ability to provide developmental feedback to reviewers and editors on their performance was critical if the researchers in these roles were to improve in their performance. To address this, at considerable expense in time, money, and effort, the institute contracted to develop its own peer reviewing and publication system. The current version of the system requires editors to provide feedback both to reviewers and authors, and each editor-in chief is further required to provide feedback to editors on their performance. The system supports many features that are not readily available in existing alternatives, such as collaborative authoring, automatic assignment of DOIs, many different automatic messaging alternatives to generate reminders, and a user-friendly

interface that supports both journals and conferences. The system also supports partner journals and partner conferences, which pay a use fee well below that of widely used commercial peer review products, such as Manuscript Central.

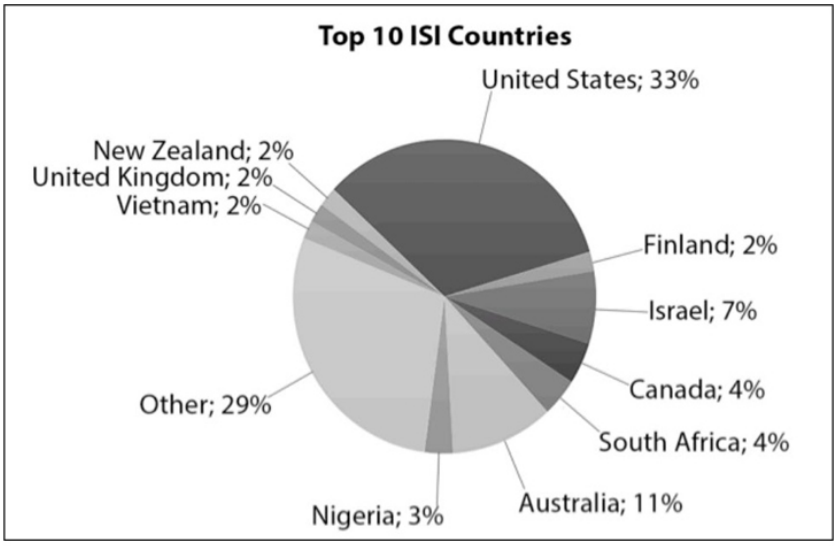


Figure 2: The Percentage of Articles with Authors Representing Various Countries
(from Murphy, 2020, p. 170)

The institute requires its journals, including its partner journals, to be open access and to subscribe to its stated philosophy of mentoring authors, reviewers, and editors. For its first two decades, no APC was charged for any of the institute's publications. In 2016, one of the institute's tasked with investigating how to achieve better visibility across the research communities it seeks to serve. Based on the advice of an Australian research librarian—who asserted that having an APC was critical to building the credibility of its publications—the institute decided to levy a fee of $75 per article in 2018. That amount was chosen based upon the cost it was paying for proofing ($50/article) and was waived for members of the institute—regardless of how many articles were submitted and published over the course of a year. Not coincidentally, the cost of an annual membership was also set at $75. Not surprisingly, most authors chose to become members.

On 18 November 2018, in response to what the institute thought was a routine application to the Directory of Open Access Journals (DOAJ), it received the following correspondence:

Following your applications for journals to be listed in DOAJ, our staff has undertaken a detailed review of your journals. This review has produced evidence of poor editorial conduct. In particular, we found evidence of:

- Editorial board members linked to questionable publishers
- Anonymous website registration

We conclude that your journals do not adhere to many of the principles of good publishing practice.

It is therefore the decision of the DOAJ management to reject the applications for your journals and remove any journals already included in DOAJ from Informing Science Institute or any affiliated

publishers.

When the institute appealed the decision, it offered to change the website registration (something the domain registrar specifically warned against doing), also pointing out that the organization's leadership and the business address of the institute (the executive director's place of residence) were easily found on the institute's website. It also asked for further clarification on the editorial board members in question. The DOAJ denied the appeal and indicated that they could not release the names of suspect members owing to privacy concerns. They would also not name the "questionable" journals.

Subsequently, on January 19, 2019, the Informing Science Institute was added to the list of "possible predatory publisher" on the anonymous copycat Beall's site. No explanation was given, nor was any response to a query submitted on the site's contact form. Inclusion on the list has led several authors to withdraw their unpublished manuscripts that had already been accepted after going through the full peer review and revision process.

It is telling that Beall himself recognizes the potential value of research communities run by volunteers and guided by a common purpose:

There are many tight-knit communities of researchers centered on a field or sub-field who cooperatively edit journals — both subscription and open-access — and whose voluntarism and tight editorial control makes each of these community-supported journals Such communities enable effective and meaningful communication among peers, and such journals should be models for all scholarly fields. (Beall, 2018, p. 3)

From my perspective, the Informing Science Institute is precisely the type of organization Beall described. To explain that perspective, I now turn to considering how my involvement with the institute has impacted my professional research career.

Personal reflections

Owing to the lack of transparency from an anonymous Beall's list copycat and DOAJ organizations, it is difficult to fathom the underlying processes that led to the decisions to exclude the institute. What I can describe, however, is my experience as a researcher involved with the institute and as an active participant in the organization. Some key elements of the relationship include the following:

• My first publication in the journal Informing Science (Gill & Hicks, 2006) has been cited well over 100 times according to Google Scholar. While this would not be a particularly impressive number for a top tier journal in my field, it would be extremely atypical for a predatory journal article, since these tend to be cited only rarely (Björk, et al., 2020). In total, my citations in the institute's publications exceed 800. My original article has also been central to my research agenda for the past 15 years.

• My second publication in Informing Science, co-authored with one of the most cited researchers in my field (Gill & Bhattacherjee, 2007), led directly to two publications in the premier journal in my discipline, MIS Quarterly (Gill & Bhattacherjee, 2009a, 2009b).

• A publication I co-authored in the International Journal of Doctoral Studies (Gill & Hoppe, 2009) has been cited more than 80 times. It led to an interview with Bloomberg BusinessWeek and was

instrumental in the establishment of a highly successful Doctor of Business Administration program at my university; a program that I now lead.

• In collaboration with the institute, I served as principal investigator on a $170,000 grant from the U.S. National Science Foundation to develop case studies for a capstone course; the institute provided an outlet for these cases through launching the Journal of IT Education: Discussion Cases. The Informing Science Press also published a book I wrote on case writing (Gill, 2011), fulfilling another deliverable requirement of the grant.

• I received a $58,000 Department of Defense grant to investigate the informing flows of a weeklong event (Murphy et al., 2015).

• I received a core Fulbright award to help South African faculty members learn how to write ICT for development case studies; the invitations I received to work with six South African universities were all set up by colleagues from the institute. It led to a book published by the Informing Science Press (Twinomurinzi, et al., 2018).

• I served as principal investigator on a subsequent $300,000 grant from the U.S. National Science Foundation to develop a series of cybersecurity case studies. Once again, the institute served as a partner organization for the grant. The cases developed led to a book published by the Informing Science Press (Gill, 2018).

The list that I have provided is far from complete. Given the positive impact of my involvement with the institute on my professional career—along with my direct observation of the selfless activities of the many individuals who volunteer their time and intellect to the institute—it is unfathomable to me that it could be considered predatory by any measure.

JOURNAL OF SYSTEMICS, CYBERNETICS, AND INFORMATICS

The Journal of Systemics, Cybernetics, and Informatics is an open journal published by the International Institute of Informatics and Systemics (IIIS). Its content consists primarily of articles fast-tracked from two annual conferences organized by IIIS and held in Orlando, Florida. Because conference submissions often end up in related journals, many researchers lump predatory journals and conferences together (e.g., Cortegiani et al., 2020; Sonne et al., 2020). The journal has been blacklisted by Cabell's International and rejected by the DOAJ (Strinzel, et al., 2019).

Background

The IIIS was established by Dr. Nagib Callaos, then dean of research at Venezuela's Simon Bolivar University, one of the leading universities in South America. Its principal goal was to foster communications between disciplines and, particularly, between the separate worlds of the academy and practice. To accomplish this, IIIS runs two annual multi-conferences. These conferences seek contributions across a very wide range of topics.

The conferences IIIS organized in Orlando several times a year were highly successful, attracting over a thousand participants in the larger summer session. Then, in 2005, the situation changed. Three graduate students from Massachusetts Institute of Technology submitted a computer-generated paper using a tool called SCIgen that produced nonsensical but superficially plausible-looking papers (Massachusetts Institute of Technology [MIT], 2015). When the paper was assigned to multiple reviewers, none of them responded. Such withdrawal by reviewers is not uncommon when they feel that they cannot adequately review a submission. Callaos himself could not make sense of it but, given the resumes of the authors,

decided to accept it for presentation at the conference—communicating clearly to the authors that it was unreviewed.

The result was a media storm, with outlets including Boston Globe, CNN, and the BBC picking up the story (MIT, 2015). The detail they omitted was the "unreviewed" part. Given the nature of the conference, I am not at all surprised that the authors were invited to present. The whole purpose of the conference is to inspire communication. Given the credentials of the authors, allowing them to present their work would—hypothetically—offer the opportunity to provide them with feedback on how to communicate their ideas better. The decision was not, as the media implied, a failure of the peer-review process.

The fallout from the episode was severe. Attendance at subsequent conferences fell between 80 and 90 percent. Despite the setback, the conferences and journal continued, although never returning to their prior attendance levels. In the subsequent years, Callaos directed much of his focus on issues that relate to academic communications, particularly peer review. To make the peer review process more effective, he instituted a two-stage process. First, an author would need to get one or more colleagues to review the manuscript and attest to its quality. The manuscript would then go through the more traditional double-blind peer-review process. Finally, he would check over the manuscript himself. In cases where the manuscript was deemed to be particularly outstanding, authors were offered the opportunity to present at a plenary session on a topic of their own choosing.

Personal reflections

I have had the opportunity to participate in the IIIS conferences at least 15 times over the past 10 years, mainly as a plenary speaker and discussion leader. My observation is that the 2005 incident resulted from a complete misunderstanding of the nature of the conference by the students involved. In engineering-related disciplines, conferences are often the principal means through which knowledge is disseminated. In many cases, these conferences are highly competitive and count as much as journal publications (or more). Thus, it is somewhat understandable why an engineering conference "having loose standards" (MIT, 2015) might be of concern, and perhaps even targeted for ridicule.

The IIIS Conferences, however, are not engineering conferences, nor do they intend to be. Rather, they were set up to provide a venue for different disciplines to communicate with each other. The first day of each conference is generally set aside for workshops and "conversational sessions" where participants gather in a room and discuss communications-related topics such as the validity of peer review and breaking down the barriers between academic research and practice. The remainder of the conference is devoted to paper presentations and numerous plenary sessions. The latter are presented by invited speakers and by researchers whose submissions were singled out as being outstanding, as noted previously. Given these objectives and structure, such a conference needs to be evaluated in a manner entirely different from how one might judge an engineering or management research conference.

My experience has been that the conference offers content that is both thoughtful and extraordinarily diverse. Presenters that I have found particularly interesting include a Japanese professor of and engineering who bring his students to the conference each year to present their work, a veterinary oncologist who travels the country to visit with rottweilers that have lived unexpectedly long lives so as to understand the aging process better, a digital custodian of the record of Alexander von Humboldt who talks about the remarkable career of this explorer/scientist and how it is being made accessible to the

global community, a physicist who has built his pattern detection software based on our understanding of how the brain works and seeks to understand better how music impacts our thinking, a group of U.S. and European researchers who are applying the principles of cybernetics to understanding science. And many more.

Participation in the conference has also proved to be an asset to my professional career. In the late 1990s, Dr. Callaos hosted a track on informing science at his conference, located in Venezuela at the time. That was the debut of informing science at a conference venue. In 2010, he asked Eli Cohen, the founder of the Informing Science Institute, to give a plenary presentation at the conference. Cohen, in response, sent him a copy of a book I had just published with the institute (Gill, 2010) and suggested that I be invited as well. Callaos was so taken with the book that he created special conference track built around it. When I later published a book on the case method, he created a track for cases as well.

The tracks created for the conference proved invaluable to me. For example, one of the presenters— a professor and later dean of a prestigious Central American business school—talked about the potential impact of discussion cases on practice. He also attended a workshop on case writing that I facilitated. Subsequently, he served as the editor of a special section of the journal Informing Science focusing on the impact of cases on practice. He also served as the editor of a special issue of journal Management Decision honoring my contributions to the field (Ickis, 2014). A faculty member from the Naval Postgraduate School in Monterey attended the conference after reading about informing science. He later invited me to a unique field event that brought together active-duty military personnel, academics, and individuals with unclassified technologies that might have applicability to the armed forces or emergency services. Subsequently, I was awarded a DoD grant to study the event as an informing system. During both my NSF case development grants, the conference was as a venue for the case writing workshops that I had promised to deliver. During one of these early workshops, a faculty member from Vietnam invited me to speak at a Ho Chi Minh City conference and offer an extended version of the workshop. A year after the presentation, I served as editor of a collection of cases developed by the faculty and students as his institution, published in book form (Gill, 2014). This experience served as the inspiration for the Fulbright project that I subsequently proposed, described in the previous case.

In terms of the journal, I published one article in the Journal of Systemics, Cybernetics, and Informatics cited eight times and two others in the conference proceedings, one cited 28 times, and one cited four times. None of these counts represent particularly major achievements. Still, I would also note that the journal has published one article with nearly 1000 citations and has garnered over 4400 citations overall, according to Google Scholar. According to a search performed with Harzing's Publish or Perish, approximately 94% of the 419 articles identified as published in the journal have at least one citation. This is well above the 50% of articles typically cited across journals that have been labeled as predatory (Björk et al., 2020).

DISCUSSION

There is no doubt that some journals and publishers intentionally mislead authors and violate numerous good research and publication practices. A considerable difference of opinion remains concerning the use of the label "predatory" and the process by which journals and publishers should be classified as such. In this section, I look at the pros and cons of classifying journals as predatory through the lens of Type 1 vs. Type 2 errors, then provide five recommendations for improving the process.

TYPE 1 VS. TYPE 2 ERROR

Assuming for the moment that it makes sense to compile a list of offending journals/publishers, the key question is the degree to which we tolerate Type 1 errors (i.e., mistakenly classifying a valid journal as predatory) compared to Type 2 errors (i.e., failing to include a predatory journal on the list). In deciding the weight given to each type of error, it makes sense to assess the relative cost of each type of error. This is likely to vary considerably by discipline. In disciplines where a predatory article can have a serious impact on the underlying science and the broader community, Type 2 errors present a clear and present danger. Currently, the use of lists such as the revised Beall's list would be with this view, its high potential for Type 1 error aside (e.g., Keller, 2019). On the other hand, Type 1 errors can lead to serious career and financial costs to researchers, journals, and their editors. Where the cost of Type 2 errors is low, or the probability of Type 1 errors is very high, it would make sense to be extremely cautious in applying the predatory (or some alternative) label to a journal.

Cost of Type 2 errors in business and information systems research

Because the relative weights of Type 1 and Type 2 errors are expected to vary considerably by discipline, I focus my attention here on my research areas: business and information systems. I expect that some of these arguments could be applied more broadly to research in the social sciences. The typical cost of Type 2 errors is difficult to compute for a variety of reasons. Looking at it in terms of cost per article, factors that need to be considered include:

1. The typical cost of an article that is inappropriately published by a predatory journal.
2. The typical cost of an article that is inappropriately published by a non-predatory journal; this may be substantially higher than item (1) since the predatory journal article is likely to be cited much less widely (Frandsen, 2017).
3. The probability that an article in a predatory journal is invalid.
4. The probability that an article in a non-predatory journal is invalid.

None of these costs or probabilities can be determined with any accuracy. To get a general sense, I consider them with respect to the stakeholder communities presented earlier in Table 2. Science and Community Stakeholders. Within business and information systems research a good case can be made that the costs (1) and (2) are likely to be quite low with respect to the external "science" (i.e., the broadly defined business/IS research body of knowledge) and "community" (i.e., business and information systems practice) stakeholders. The source of these costs could arise from both the findings presented in an article and through the adoption of improper methodologies inspired by an article.

Invalid Findings: For the "science" stakeholder, a key issue is the degree to which the research find ings—however high quality the research itself may be—are likely to replicate. In business research, it is widely recognized that context is a very important factor in determining how various factors (e.g., independent variables) impact a particular outcome (e.g., dependent variable). Perhaps for this reason, relatively few attempts to determine if relationships generalize across contexts exist. On the rare occasion where such efforts have been made (e.g., Hubbard & Vetter, 1996), the degree to which findings have failed to replicate has been appalling. This makes any proposition that a predatory paper will impact our science moot.

In the broader social sciences, greater control of context can be achieved through well-planned laboratory experiments. Thus, we would expect the degree to which they replicate to be much higher. test this, a study of 100 well-known and widely accepted psychology studies was conducted by the Open Science Collaboration (2015). The researchers made systematic attempts to replicate each study as faithfully as possible. Although 97% of the original studies had statistically significant only 39% of the findings replicated. When the new results were combined with the original results, the 97% dropped to 68%. What is critical to note here is that these were "classic" studies, ones that appeared widely in psychology textbooks and were largely treated as fact.

In considering the potential cost of an inappropriate article to the broader community, the most relevant question is the degree to which the invalid findings articles are likely to impact that community. While I have no means of estimating the impact on the overall social sciences, I have argued at elsewhere that the impact of business and IS academic research on business practice is (Gill, 2010). While not repeating those arguments here, they mainly derive from the fact that academics are primarily rewarded with respect to their ability to communicate with other measure the effectiveness of such communication mainly through the tier of the journals we publish in and the degree to which other researchers cite our research. This system provides little for devoting time to impacting practice. It also means that if an article were to report findings relevant to practice, it is only likely to do so if published in a very small set of practice-targeted journals, such as the Harvard Business Review.

Invalid Methodologies: Excepting research directed towards the scholarship of teaching and learning (SoTL), business researchers are unlikely to be in situations where they would directly apply the ings of their own research. Costs might be incurred when subsequent authors are influenced an invalid methodology detailed in an improperly published article. The research I surveyed did express concerns about the methodological weaknesses found in predatory journal publications Kurt, 2018). Nevertheless, I could not find any report of subsequent methodological irregularities inspired by the publication of an article in a predatory journal. I can speculate on a couple of possible explanations. First, to adopt a methodology from an article necessarily requires careful study of article. To the extent that the article suffers from the deficiencies attributed to predatory publications, the researcher should quickly detect these and reject the article as a source of inspiration for research design. Second, if authors were to seek out a methodology to imitate, it would make sense to choose one published in the top tier of journals rather than one they just happened to come across in some random journal. Thus, the cost to science of Type 2 error resulting from the diffusion of poorly constructed methodologies seems likely to be low.

Author, Publisher, and Institution Stakeholders. For authors and publishers, costs of Type 2 errors are likely to be dwarfed by those of Type 1 error. The authors' major risk seems to be that an illegitimate journal that is not labeled as such (Type 2 error) is later correctly labeled, thereby placing the authors' reputation at risk and causing their previously published research to be ignored. both publishers and authors, there is also a potential opportunity cost: through submitting to a journal that is, in fact, predatory, authors lose the opportunity to have their article published in a legitimate journal more likely to garner citations; legitimate journals lose the opportunity to review and publish the authors' articles.

For institutions, the potential cost of Type 2 error is clear cut. Beall (2017) speculates on these costs particularly forcefully:

I think that, since the advent of predatory publishing, there have been tens of thousands of researchers who have earned Masters and Ph.D. degrees, been awarded other credentials and certifications, received

tenure and promotion, and gotten employment – that they otherwise would not have been able to achieve – all because of the easy article acceptance that the payto-publish journals offer. (p. 275)

As mentioned earlier in Table 2, McLeod et al. (2018, p. 121) presented a specific example of the impact of not knowing that journals are predatory (which is the equivalent of Type 2 error) in a promotion and tenure case where the candidate's entire research package consisted of pay-to-play journals. The McLeod et al. (2018) example raises some interesting questions. The full version of the earlier quote is as follows:

The department tenure committee, the dean of the college, and the university president were all impressed with the applicant's tenure packet, which listed 15 articles in prestigious-sound ing journals. In addition, the professor was well liked by his colleagues and his department chair. His teaching was only ''adequate,'' but no one seemed to mind because so many of the tenure decisions at his school depended upon an applicant's publication record—in this case, a seemingly stellar one. The recommendations from the review bodies were consistently favorable, and the professor was awarded tenure in the spring semester. No one noticed the fact that all 15 of the articles listed in his application appeared in ''pay-to-publish'' journals— publication outlets that masquerade as serious, legitimate scholarly periodicals but in reality are mostly financial scams. In short, the professor had bought his way to tenure. (p. 121)

There are two distinct possible interpretations of this example at the extremes, assuming that it is accurately presented. The generous interpretation is that the faculty member in question had published some strong research but had perhaps been unwise in choice of outlets (several of which were improperly categorized as predatory, since such errors happen). In this interpretation, the tenure committee examined the articles, as they would be expected to do, and the external evaluators did the same—as would be their responsibility in accepting the task. Based on this analysis and their direct observations of the individual during the roughly 5-year pre-tenure period, the faculty member's research was judged to be of sufficient quality to make up for only adequate teaching.

The other extreme alternative is that the institution in question was run by the village idiots and deserved the consequences. Under this interpretation, the faculty member in question did, in fact, tenure by publishing work that was not good enough for respectable journals using pay-to-play lets. For this to happen, both the promotion and tenure committee and the external reviewers must have ignored the articles' actual content and where they were published in their decision processes. This casual attitude towards content would be indicative of collective insanity at a research-intensive university. On the other hand, any other category of university that would willfully ignore substandard teaching in their promotion and tenure decisions and base their decision on mere article counts suffers from seriously misplaced priorities.

The question of which extreme interpretation is closer to the truth brings us to the earlier mentioned factors (3) and (4), the relative probabilities that an invalid article will be published by a predatory journal vs. a non-predatory journal. Central to resolving this question is the relative validity of their respective peer review processes.

Peer Review. Of all the criticisms raised against predatory journals, the inadequacy of their peer review processes is the most described. The typical scenario is described as follows: to acquire APCs from authors, predatory publishers mislead (or collude with) authors by claiming rapid peer review but, in

fact, faking such reviews or sending it out to reviewers that will always accept a submission with few or no required revisions. Under this process, the quality control element of peer review and the opportunity for authors to improve their article by responding to constructive comment from the reviewers are totally absent from the process.

I do not doubt that the typical scenario just described is precisely what happens in those journals are truly predatory. The problem arises when you accept that Type 1 and Type 2 errors in classifying journals exist. It is further compounded when weaknesses in the peer review processes of non-predatory journals are considered. I have looked at the deficiencies of peer review in greater detail elsewhere (Gill, 2010), so I will limit myself to one example.

William Starbuck (2003, 2005) was the editor-in-chief of one of the most prestigious business research journals, Administrative Science Quarterly. He conducted an analysis that looked at the level of consensus between peer reviewers in their rating of 500 manuscripts submitted to that journal. What he found was a correlation of 0.12, statistically significant but nearly meaningless for practical purposes. Running a simulation using data from ASQ and other journals, his midpoint estimate of the percentage of articles published that were not in the top 20% in terms of intrinsic value was 57% (Starbuck, 2005, p. 197).

While this high level of error in top-tier journals does not excuse the blatant disregard of peer review processes in true predatory journals, it does suggest that considerable randomness exists in whether top tier journal ultimately accepts a manuscript. Thus, neither the publication nor the rejection of a manuscript by such a journal can be taken as indisputable evidence of its quality. Similarly, we might expect that journals labeled as predatory may have some good reviewers as well as some weak or bad reviewers.

In summary, the costs of Type 2 errors are paid primarily by the institutional stakeholder. Universities make decisions to award degrees and decisions to hire and promote under the assumption certain journals are reputable. If they are not, the decisions are being made using false assumptions. However, what is also true is that institutions can put processes in place that minimize the likelihood of serious damage from Type 2 errors. These mainly involve looking beyond journal lists in ing research. As suggested by the San Francisco Declaration on Research Assessment (DORA), these mainly involve paying more attention to the actual quality of the articles themselves (Cortegiani, 2020).

Cost of Type 1 errors

Unlike Type 2 errors, the costs of Type 1 errors are paid primarily by author and publisher stakehold ers. As illustrated by the Informing Science Institute and IIIS cases presented previously, there is a heavy price to be paid for even the possibility that a publisher, journal, or conference is predatory. In the case of IIIS, the impact of the 2005 incident with MIT students is still being felt more than a decade and a half later. In the Informing Science Institute case, several authors have withdrawn papers because of concerns related to how their employing institution might react. Moreover, inclusion on a predatory publishing list often leads to removal from key indexes. Such removal can have a serious impact on authors. For example, to get credit for a publication at most South African universities, the journal needs to be included in the Scopus index (Hedding, 2019). A journal dropped from that index will lose its ability to attract authors from many countries and many universities. This is precisely why a Type 1 error can be so damaging.

More broadly, Type 1 errors serve to undermine the legitimacy of all open access publishers by over stating the presence of bad actors. By virtue of the same reputational effect, these same errors may work to benefit the for-profit publishing sector. These same publishers often own or work closely with the very indexes that are quick to drop open access journals as predatory.

For authors, Type 1 errors can be equally damaging. Being listed as an author on an article can hurt an author's reputation (Richtig et al., 2018) should the publication be unfairly labeled as predatory. As shown in the Informing Science Institute case, just being on the editorial board of a journal labeled predatory can impact you and your colleagues. And, because the labeling process fails every conceivable test of transparency, there is no recourse.

Balancing the error types

So how do we balance the different two types of errors when classifying predatory journals? As I stated earlier, it is likely to vary by discipline. In research domains where results are expected cate and where research findings can significantly impact the science or the broader community, it may make sense to be cautious. To avoid spurious research impacting the science and the community, minimizing Type 2 error at the expense of accepting the damage caused by Type 1 error might be the best compromise. In domains where results are highly context dependent and where reviewers rarely agree on the merits of a manuscript, reducing collateral damage to reputation and careers through minimizing Type 1 error may be the better choice.

Naturally, in the ideal world we would seek to minimize or eliminate both types of error. Unfortunately, there are tens of thousands of research journals and to make a reasonable determination of a journal's merit can, or at least should, take a considerable amount of time and careful deliberation. As noted in Table 3, one proposal has been to establish a "predatory rank" based upon a journal's acteristics (Dadkhah & Bianciardi, 2016), acknowledging that the degree to which a journal is predatory is not black and white. Unfortunately, my intuition suggests that the more predatory a journal, the more likely that it will lie about its characteristics. That means a time-consuming verification process would be required to make an accurate determination.

RECOMMENDATIONS

Given that objective, unbiased and systematic third-party validation of all journals—probably the best solution to the problem of predatory journals—is unlikely to be financially viable, what other possible solutions can be proposed? I now turn to some possible recommendations, both gathered from the literature and my own.

#1 – Drop the predatory label

A particularly creative approach to the question of predatory publishing involved taking the five stages of predation—detection, identification, approach, subjugation, and consumption—and applying them to the predatory publishing process:

the 'detection' consists of finding authors who have published in other journals; 'identification' consists of getting their contacts; the 'approach' is stage starting with the CFPs' and ending with the author paying no attention or being subjugated; 'subjugation' is the submission stage; and 'consumption'

coincides with charging the author. (Petrişor, 2016, p. 2)

The problem with the analogy is that it can be applied to practically any publisher (with the possible exception that consumption might involve requiring the authors relinquish their copyrights for those journals that do not change an APC). Also, it fails to distinguish between those journals that intentionally mislead and exploit authors—journals that I would happily label as predatory—and those that are simply inexperienced, inept, or have a different mission (a topic I will return to later). This concern was noted in the literature several times (e.g., Cortegiani et al., 2020; Eriksson & Helgesson, 2018). Labeling a journal as predatory also implies the authors that submit to the journal are "prey". While there are many examples in the literature of authors were unaware of the nature of the journal to which they submitted (e.g., Cobey et al., 2018; Memon, 2018), there are also cases where authors are willing co-conspirators (Bagues et al., 2019).

My recommendation would be that the term "predatory" be dropped and that a distinction be made between legitimate and illegitimate journals. What would distinguish an illegitimate journal would be that it intentionally misleads authors and institutions. For example:

- It may intentionally hide its fees from authors.
- It may be vague or simply lie about its peer review practices.
- It may intentionally publish plagiarized work.
- It may pad its editorial board with individuals that have not consented to serve.
- It may lie about its metrics or the indexes it is listed in.
- It may fail to take action in cases where reviewer misconduct is identified, such as stealing another authors ideas while it is under review.

These practices and others have all been observed and mentioned in the literature. What makes a journal illegitimate is that it engages in such practices by intent.

#2 – Evaluate the quality of peer reviews

In my analysis of Type 1 vs. Type 2 error, I argued that the main cost of Type 2 error would be paid by institutions through hiring, promoting, or rewarding researchers whose publications were "pay play." Thoughtfully evaluating the work (as opposed to where it was published) in the scholar's portfolio would arguably be the best solution. Alternatively, as a shortcut, applicants for jobs and promotion and tenure could be required to include copies of the peer reviews they received for each article they published along with the articles themselves. The quality and depth of those reviews—which can be relatively easily assessed (based on my experience as an editor)—would almost certainly allow nearly all blatantly illegitimate journals to be identified immediately. In addition, authors could be encouraged to withdraw the submission from any journal that did not provide substantive reviews before the manuscript reaches the revision and publication stage.

This recommendation parallels the open peer review (Dobusch & Heimstädt, 2019) solution proposed in the literature. While the open peer review would certainly be better at making a journal's weaknesses in peer review public, it might also raise serious privacy concerns. Many journals could refuse to participate. Authors, however, will necessarily have access to the reviews of their own submissions. Privacy and participation concerns would not be an issue in the more limited approach recommend. It would also not be too great a departure from existing practice. At my institution, we frequently

encourage job applicants to provide access to student comments from their teaching evaluations along with numeric scores.

#3 – Mission categories for journals

Within higher education, it has long been recognized that different institutions have sions. It would not make sense to judge a university established to help a previously underserved constituency become better prepared for the workforce using the same criteria as we would for a well-funded university whose success is judged principally by its contributions to scientific research and the number of Nobel laureates on its faculty. To deal with the problem of differing missions, enlightened agencies base their decision to accredit an institution on the how an institution's practices fit with its mission. For example:

the institution (1) has a mission appropriate to higher education, (2) has resources, programs, and services sufficient to accomplish and sustain that mission, and (3) maintains clearly specified educational objectives that are consistent with its mission and appropriate to the degrees its offers, and that indicate whether it is successful in achieving its stated objectives. (SACSCOC, 2017, p. 3).

Many of the problems associated with the so-called predatory/non-predatory distinction might be alleviated if legitimate journals were to specify their mission, using a list of mission categories that they were striving to achieve. I propose the list of categories shown in Table 4 as a starting point.

Table 4: Proposed Categories for Journals

Category	Mission	Criteria for Assessing Success
Competitive	To have high impact on the scientific community.	High rejection rate, high citation rate, scrupulous adherence to accepted principles of peer review, high profile authors and editorial board from research universities, coverage of research topics with expert reviewers, high survival rate.
Developmental	To develop the research, writing and reviewing skills of participants while contributing to knowledge.	High rate of transforming manuscripts into acceptable research papers, supportive and constructive peer review, diverse board and authors that includes both high profile researchers and researchers from underserved communities, support for learning activities such as research and writing workshops, modest citation rate with occasional highly cited outliers.
Exploratory	To develop a new research area and build its visibility.	Nurtures development of a research community, citations or references to the area within mainstream disciplines, awareness of each other's research (e.g., citations to each other's papers; participation in supported activities, such as conferences), early-stage pivots to policies and mission to be expected.
Translational	To foster communication between separate communities, such as distinct disciplines or between the research community and practice	Clarity of articles, balance in membership in editorial boards and authors across the targeted communities, collaboration between authors in the targeted communities, peer review conducted by both expert and non-expert reviewers to ensure clarity, support for alternative paths of communications, such as conferences and books.

Consistency with mission could lead to a dramatic difference in how journals are operated—and what activities are considered "legitimate." For example, a journal that presents itself as competitive would likely:

1) Take pride in a high rejection rate.
2) Enforce policies to reduce potential favoritism or conflict of interest, such as:

a) Ensuring peer review was fully anonymous.
b) Avoiding overlapping editorial boards.

c) Preventing individuals from reviewing others from the same institution.
d) Preventing individuals from reviewing others that they have co-authored with in the past.
3) Only assign reviewers to a manuscript with high levels of expertise in the subject area.
4) Encourage many rounds of review before a manuscript is accepted.
5) Prevent citation counts from being gamed with policies such as:

a) Discouraging self-citation.
b) Avoid encouraging authors from citing each other, particularly pre-publication in situations such as papers being collected for a special issue (a practice that has been referred to as a "citation cartel"; P. Davis, 2014).
c) Refusing to publish research whose results have been published elsewhere in a different form.

Policies like these make sense if you view research as a game and you want to be sure that no one has an unfair advantage in scoring—as measured by citation count. The problem is that (1) is a idea if an important element of a journal's mission is to help authors develop their research and writing skills; (2a) and (2c) just add red tape to the development process—while implying viewers are not trustworthy—and (4) would discourage authors until most drop out. (3) would be awful for a journal with a translational mission since papers promoting communication between distinct communities need to be readable by non-experts. (5b) would greatly limit authors trying to build a community in a new research area. I am not sure that (5a) makes sense in any context except when citations are solely a means to keep score. (I would rather feel that I am reading the authors' mature thoughts rather than their first stab at the topic.) (5c) ignores that different audiences are likely to attend to different communications channels and respond to different formats.

The ability to target one or more of the missions could also be of great benefit to the journals involved. The practices of the competitive mission can be very limiting. For example, I refer to the Engaged Management Review (EMR), the journal of the Executive DBA Council. Announced in 2014, the open-access journal sought to enter a new space—practitioner-scholarship—and sought to foster communication between business research and practice communities. Natural mission categories would therefore have been exploratory and translational. The journal's policies, however, rigorously adhered to the rules of the competitive category. The founders put together an editorial board of top scholars from the business research community. They scrupulously adhered to the practices of strict peer review. By the standards of competitive journals, they did everything right.

What were the results? Almost all their first 20 submissions were either rejected or the authors dropped out, consistent with a high rejection rate. (I believe two may have eventually been published). The peer review process—in which I participated as a reviewer—seemed like a never-ending series of cycles.

More than six years after their announcement, they had 14 articles published, 8 of which had a founding editor, managing editor, or senior member of the editorial board as author or co-author. Of EMR's 61 Google Scholar citations, 44 were for an article that had been widely circulated before the journal's launch. Of the 25 authors that contributed, 23 were either alumni or affiliated with one of two institutions: Georgia State University and Case Western Reserve University. We cannot know how EMR would have evolved had they adopted practices better fitted to exploratory and translational missions at the outset. However, given its limited reach, it seems that the journal is far from reaching its full potential.

The proposal that journals be allowed to specify their own mission and then tailor their processes to that mission would likely be controversial. Many researchers, particularly at more elite institutions, are likely to subscribe to a philosophy like "Researchers hold an ethical obligation to (1) findings and (2) to publish their findings in high-quality scholarly journals." (Strong, 2019, p. 664). I doubt that many developmental journals would pass that test. But it would be a huge mistake to equate the journal's prestige with the potential value of the underlying research. Researchers in the developing world may lack the funding, access to top-tier conferences, and extensive training to ease their way into highly competitive journals. They may also have access to some of the most and societally meaningful research contexts. With the proper mentoring and encouragement, such research may provide a valuable contribution to the literature, just as exploratory journals may one day disrupt the status quo and translational journals may provide a means through which our research informs other disciplines and even practice.

Unfortunately, there are still plenty of bad actors in the world of open-access journals. A mission focused system will not make them go away—although forcing them to state their mission (most likely "competitive", to attract unwary authors) should make it easier to debunk their claims. It should also make it easier to avoid Type 1 errors for journals that truly are developmental, exploratory, and/or translational in their goals.

#4 – Institutional portfolio of journal missions

Over my thirty years as an academic, I have seen universities increasingly rely on lists directing their faculty where to publish. As an institution grows in research stature, those lists tend to get shorter. At my institution, for example, a journal must be included in Financial Times list of 50 journals (Ft50) or the University of Texas Dallas list of 24 journals (UTD24) if it is to count favorably towards promotion, tenure, and significant course release. Since the two lists overlap considerably, that is a very small number of journals out of the many thousands of business journals. And, of course, they are all highly competitive.

The use of lists like these could be interpreted as a commitment to rigor. That is, of course, how we would prefer to interpret it. There is another interpretation, however. Since our focus is strictly on competitive journals, we must not care about:

• Helping authors from underserved communities with few resources develop their research skills. In this context, it is worth noting that one of the complaints raised against labeling journals predatory is that it disregards the needs of, and prejudices us against, researchers from developing countries (Eriksson & Helgesson, 2018). Shouldn't our senior faculty provide service by helping mentor these researchers instead of being penalized if they participate in a journal with a non-competitive mission?

• Exploring new research areas. It has been argued that major departures from prevailing paradigms can lead to the label of crackpot (M. Davis, 1971) and that reviewers from top-tier journals are inclined to be overly conservative (Pfeffer, 2007). Are we discouraging academic entrepreneurs by discounting startup journals in new areas?
• Communicating our research to practice. Since there is scant evidence that our current academic research publications are ever reaching practice, at least in business and information systems, should we not be publishing in outlets specifically intended for such purposes, whatever their academic rank?

Framed in this way, a case can be made that each institution or department would do well to establish a portfolio target for its publications. For example, a 60-20-10-10 target might mean that it would like to see 60% of its research activities directed towards competitive journals, 20% towards developmental journals (e.g., editing, reviewing, and co-authoring with local researchers), 10% towards exploratory research, and 10% towards research intended to inform practice.

Under such a portfolio system—whose specific goal percentages would vary dramatically depending upon the nature and mission of the institution—individuals would be free to choose where they wanted to expend their efforts. For example, those researchers who were most concerned with increasing their value on the academic job market and reducing the time they spend teaching would, quite naturally, focus on competitive publications. However, that would be fine since it would make more room for other researchers who wished to pursue alternative objectives. Over the long run, stitutions could also move towards their targets through their hiring decisions.

Unfortunately, there is no obvious way to require institutions to adopt such a system. For faculty, particularly a school's most prolific researchers, the current system works just fine. The most likely path through which such a system could be instituted is at the behest of the accrediting Such a path is not out of the question since these agencies are currently emphasizing the consistency of a college's policies and practices with its stated mission.

#5 – Crowd-sourcing journal ratings

At the beginning of this section, I suggested that the best way to minimize the threat posed by illegitimate journals would be to have each journal periodically evaluated by an independent agency. Effectively, this process would mirror the process used in institutional accreditation.

Realistically, I believe such a plan is impractical. The number of journals likely outnumbers institutions by an order of magnitude. Unlike universities, journals frequently come and go. Institutions seeking accreditation pay for the process. Few open access journals have the resources necessary to pay for the in-depth inspection needed if Type 1 and Type 2 errors are to be minimized. Assuming 50,000 journals and a bare minimum of 20 hours to do a careful evaluation—as suggested by the cases I have presented, such an evaluation would need to go well below each journal's surface features—across the entirely of academia we could be talking about a hundred million person-hours at a likely cost in the hundreds of millions USD.

A less objective but more plausible approach would be to crowd-source journal evaluations, analogous to what was proposed by Cobey et al. (2018). Regrettably, such a process would be rife with opportunities for manipulation and fraud. Nevertheless, similar challenges with rating systems face sites

such as those used for restaurants (e.g., Yelp), products (e.g., Amazon), and sellers (e.g., Amazon, eBay). Some degree of control could be achieved by practices such as:

• Including some journal-supplied statistics as well as reviews.
• Requiring raters to register with the crowd-sourced site.
• Verifying status for certain types of ratings (e.g., author ratings, reviewer ratings, editor ratings). For example, only someone who had an article published in the journal would be able to provide a rating, and written response to a question like "How helpful was the review process?"
• Requiring a username on all reviews.
• Allowing users to rate other reviews as helpful or not helpful.
• Allowing journal officers to reply to reviews.
• Moderating review content before public posting.
• Providing a mechanism for banning individuals found to deceive or abuse the review system knowingly.

To keep the site from turning into little more than a beauty pageant, rating criteria would vary by each journal's self-classified mission category or categories. That way, a criterion such as "percent of initial submissions ultimately achieving publication" might have a slightly negative weight in an all rating for a competitive journal while having a slightly positive weight for a developmental journal. I suspect that the initiation of such a system would be opposed by organizations that already provide indexing and rating services, such as the Journal Citation Report (JCR) published by Clarivate Analytics. However, part of what these services do is substantially limit the number of journals that are indexed. In doing so, they avoid many illegitimate journals. They also eliminate many legitimate journals that simply have an alternative mission.

In the long run, I believe that indexing services that capture nearly all articles, such as Google Scholar and Microsoft Academic, can achieve a competitive advantage through the network effect. Thus, if a crowd-sourcing system for rating journals were to be developed, Google or Microsoft could by developing or underwriting its development. Other plausible developers might include research portal sites, such as Researchgate.net. These sites already collect information on papers and researchers.

CONCLUSIONS

Nobody wants shoddy or falsified research to compromise the science of their discipline. It, there fore, seems almost scandalous to suggest that the individuals volunteering their time to identify socalled predatory journals may be doing more harm than good. The question revolves around the relative costs of making Type 1 errors (classifying a legitimate journal as predatory) versus Type 2 errors (failing to identify a predatory journal). These costs are likely to vary considerably according to discipline. I, therefore, confine my arguments to my own research areas—the business and information systems literatures—where the impact of academic research on practice is arguably minimal. For these:

• The cost of Type 2 errors is low. There is virtually no hard evidence that existing so-called predatory journals damage the overall body of disciplinary research—mainly because they are largely ignored. Where damage may be occurring is to institutions that do not recognize journals as illegitimate and weigh them heavily in their recruiting and promotion, and tenure decisions. It may sound harsh, but if a university places such a heavyweight on research in its hiring and P&T decisions, then they should—at

least—read the research that is the basis of their decision.
• The cost of Type 1 errors is high. There is strong evidence that a misapplied predatory label can be devastating to a journal or publisher, as illustrated by a couple of cases. The same applies to authors that have published in the journal, even if they did so before the label was applied.
• Current approaches to identifying predatory journals are superficial at best. They are also not transparent and provide little or no means of appeal. Because journals can exist for many purposes, a proper determination that a journal is illegitimate should be done carefully.

Despite these concerns, the fact remains that a great many illegitimate journals exist, engaging in many deceptive practices to acquire revenue or prestige. While their existence may not jeopardize the world of science, they can and do exploit those researchers who can probably least afford it. Just ignoring these journals is therefore not a very satisfactory solution.

I offer five recommendations that could help minimize the problem caused by illegitimate journals:

1. Stop referring to journals as predatory and focus on identifying only those journals that are indisputably illegitimate. Illegitimacy can be determined by intentional acts such as lying on their website, knowingly failing to live up to standards they have promised to uphold, violating intellectual property rights, engaging in what amounts to identity theft by listing editors that have not agreed to serve, hiding their fees, and so on.
2. Have authors include copies of all the peer reviews that their published articles have received whenever a significant career decision is being made. Because the common thread spanning nearly all illegitimate journals is their weakness in providing constructive peer reviews, the quality of reviews is a far better indicator of a journal's legitimacy than whether or not it a appears on a list.
3. Require journals to specify what specific mission(s) they intend to fulfill and how their editorial policies are consistent with their stated mission(s). I proposed an initial set of mission categories: competitive, developmental, exploratory, and translational. I argue that a journal's policies need to vary substantially according to a mission, and that some policies that might suggest illegitimacy in a competitive journal may be viewed as best practices in a category such as developmental or translational.
4. Have institutions or departments specify portfolio targets for different categories of journals. A university would be well within its rights to indicate that it only wanted its faculty to publish in competitive journals. But that would only be consistent with an overall mission that ignores helping less fortunate colleagues in developing countries improve their research, exploring ideas that fall outside prevailing paradigms and seeking to impact practice with their research.
5. Crowdsourcing journal ratings. Because creating a set of objective agencies to rate journals and identify illegitimate ones would likely be unacceptably expensive, using crowdsourcing with a variety of built-in safeguards might provide a reasonable approximation at a cost several orders of magnitude less. Consistent with recommendations (3) and (4), the items on which each journal was rated would depend on its mission.

REFERENCES

Abad-García, M. F. (2019). Plagiarism and predatory journals: A threat to scientific integrity. Anales de Pediatría (English Edition), 90(1), 57-e1. https://doi.org/10.1016/j.anpede.2018.11.006
Al-Khatib, A. (2016). Protecting authors from predatory journals and publishers. Publishing Research Quarterly, 32(4), 281-285. https://doi.org/10.1007/s12109-016-9474-3

Bagues, M., Sylos-Labini, M., & Zinovyeva, N. (2019). A walk on the wild side: 'Predatory' journals and information asymmetries in scientific evaluations. Research Policy, 48(2), 462-477. https://doi.org/10.1016/j.respol.2018.04.013

Balehegn, M. (2017). Increased publication in predatory journals by developing countries' institutions: What it entails? And what can be done? International Information & Library Review, 49(2), 97-100. https://doi.org/10.1080/10572317.2016.1278188

Beall, J. (2012). Predatory publishers are corrupting open access. Nature News, 489(7415), 179. https://doi.org/10.1038/489179a

Beall, J. (2015a). Criteria for determining predatory open-access publishers. https://beallslist.net/wp-content/uploads/2019/12/criteria-2015.pdf

Beall, J. (2015b). Predatory journals and the breakdown of research cultures. Information Development, 31(5), 473476. https://doi.org/10.1177/0266666915601421

Beall, J. (2016). Best practices for scholarly authors in the age of predatory journals. The Annals of The Royal College of Surgeons of England, 98(2), 77-79. https://doi.org/10.1308/rcsann.2016.0056

Beall, J. (2017). What I learned from predatory publishers. Biochemia Medica, 27(2), 273-278. https://doi.org/10.11613/BM.2017.029

Beall, J. (2018). Predatory journals exploit structural weaknesses in scholarly publishing. 4open, 1, 1. https://doi.org/10.1051/fopen/2018001

Björk, B. C., Kanto-Karvonen, S., & Harviainen, J. T. (2020). How frequently are articles in predatory open access journals cited. Publications, 8(2), 17. https://doi.org/10.3390/publications8020017

Bohannon, J. (2013). Who's afraid of peer review? Science 342(6154). 60-65. https://doi.org/10.1126/science.342.6154.60

Christopher, M. M., & Young, K. M. (2015). Awareness of "predatory" open-access journals among prospective veterinary and medical authors attending scientific writing workshops. Frontiers in Veterinary Science, 2, 22. https://doi.org/10.3389/fvets.2015.00022

Clark, J., & Smith, R. (2015). Firm action needed on predatory journals. BMJ, 350, h210. https://doi.org/10.1136/bmj.h210

Cobey, K. D., Grudniewicz, A., Lalu, M. M., Rice, D. B., Raffoul, H., & Moher, D. (2019). Knowledge and motivations of researchers publishing in presumed predatory journals: a survey. BMJ open, 9(3), e026516. https://doi.org/10.1136/bmjopen-2018-026516

Cobey, K. D., Lalu, M. M., Skidmore, B., Ahmadzai, N., Grudniewicz, A., & Moher, D. (2018). What is a predatory journal? A scoping review. F1000Research, 7. https://doi.org/10.12688/f1000research.15256.1

Cohen, E.B. (1999). Conceptualizing information systems as a field of the discipline informing science: From ugly duckling to swan. Journal of Computing and Information Technology, 7(3), 213-219.

Cortegiani, A., Manca, A., & Giarratano, A. (2020). Predatory journals and conferences: why fake counts. Current Opinion in Anesthesiology, 33(2), 192-197. https://doi.org/10.1097/ACO.0000000000000829

Dadkhah, M., & Bianciardi, G. (2016). Ranking predatory journals: Solve the problem instead of removing it! Advanced Pharmaceutical Bulletin, 6(1), 1. https://doi.org/10.15171/apb.2016.001

Das, S., & Chatterjee, S. S. (2018). Cabell's blacklist: A new way to tackle predatory journals. Indian Journal of Psychological Medicine, 40(2), 197-198. https://doi.org/10.4103/IJPSYM.IJPSYM_290_17

Davis, M. (1971). That's interesting! Towards a phenomenology of sociology and a sociology of phenomenology. Philosophy of the Social Sciences, 1, 309-344. https://doi.org/10.1177/004839317100100211

Davis, P. (2014). When a journal sinks, should the editors go down with the ship? The Scholarly Kitchen, 6(October). https://scholarlykitchen.sspnet.org/2014/10/06/when-a-journal-sinks-should-the-editors-

editors-go-down with-the-ship/
Dobusch, L., & Heimstädt, M. (2019). Predatory publishing in management research: A call for open peer review. Management Learning, 50(5), 607-619. https://doi.org/10.1177/1350507619878820
Eriksson, S., & Helgesson, G. (2018). Time to stop talking about 'predatory journals'. Learned Publishing, 31(2), 181-183. https://doi.org/10.1002/leap.1135
Forero, D. A., Oermann, M. H., Manca, A., Deriu, F., Mendieta-Zerón, H., Dadkhah, M., Bhas, R., . Desh pande, S. N., Wang, W., & Cifuentes, M. P. (2018). Negative effects of "predatory" journals on global health research. Annals of Global Health, 84(4), 584. https://doi.org/10.29024/aogh.2389
Frandsen, T. F. (2017). Are predatory journals undermining the credibility of science? A bibliometric analysis of citers. Scientometrics, 113(3), 1513-1528. https://doi.org/10.1007/s11192-017-2520-x
Gill, T.G. (2010). Informing business. Informing Science Press.
Gill, T.G. (2011). Informing with the case method. Informing Science Press.
Gill, T.G. (Ed.). (2014). Information technology in Vietnam (and Southeast Asia): Discussion cases, Informing Science Press. 2014.
Gill, T.G. (Ed.). (2018). Cybersecurity discussion cases. Informing Science Press.
Gill, T. G., & Bhattacherjee, A. (2007). The informing sciences at a crossroads: The role of the client. Informing Science: The International Journal of an Emerging Transdiscipline, 10, 17-39. https://doi.org/10.28945/454
Gill, G., & Bhattacherjee, A. (2009a). Whom are we informing? Issues and recommendations for MIS research from an informing sciences perspective. MIS Quarterly, 33, 217–235. https://doi.org/10.2307/20650290
Gill, G., & Bhattacherjee, A. (2009b) Fashion waves versus informing: Response to Baskerville and Myers. MIS Quarterly, 33(4). 667-671. https://doi.org/10.2307/20650321
Gill, T. G., & Hicks, R. C. (2006). Task complexity and informing science: A synthesis. Informing Science: The Journal of an Emerging Transdiscipline, 9, 1-13. https://doi.org/10.28945/3045
Gill, T. G., & Hoppe, U. (2009) The business professional doctorate as an informing channel: A survey and analysis. International Journal of Doctoral Studies, 4, 27-57. https://doi.org/10.28945/44
Grudniewicz, A., Moher, D., Cobey, K. D., Bryson, G. L., Cukier, S., Allen, K., Ardern, C., Balcom, L., Barros, T., Berger, M., Ciro, J. B., Cugusi, L., Donaldson, M. R., Egger, M., Graham, I.D., Hodgkinson, M., Khan, K. M., Mabizela, M., Manca, A., ... Lalu, M. M. (2019). Predatory journals: No definition, no defence. Nature, 576(7786), 210-212. https://doi.org/10.1038/d41586-019-03759-y
Hedding, D. W. (2019). Payouts push professors towards predatory journals. Nature, 565(7737), 267-268. https://doi.org/10.1038/d41586-019-00120-1
Hubbard, R., & Vetter, D.E. (1996). An empirical comparison of published replication research in accounting, economics, finance, management, and marketing. Journal of Business Research, 35, 153-164. https://doi.org/10.1016/0148-2963(95)00084-4
Ickis, J. (2014), The contributions of T. Grandon Gill. Management Decision, 52(9). https://doi.org/10.1108/MD-07-2014-0448
Informing Science Institute. (2021). About. https://www.informingscience.org/About
Kakamad, F. H., Mohammed, S. H., Najar, K. A., Qadr, G. A., Ahmed. J. O., Mohammed, K. K., Salih, R. Q., Hassan, M. N., Mikael, T. M., Kakamad, S. H., Baba, H. O., Aziz, M. S., Rahim, H. M., Ahmmad, D. R., Hussein, D. A., Ali, R. A., Hammood, Z. D., Essa, R. A., & Hassan, H. A. (2019). Kscien's list; A new strategy to hoist predatory journals and publishers. International Journal of Surgery Open 17, 5-7. https://doi.org/10.1016/j.ijso.2019.01.002
Keller, R. C. A. (2019). Predatory journals and publishers: A menace to science and society? Or…. A personal perspective. Nijmegen. https://doi.org/10.13140/RG.2.2.20315.92969
Koch, C., & Johnson, J. (2018). Informing Science Institute. Muma Case Review, 3(6), 1-26.

https://doi.org/10.28945/4123

Kurt, S. (2018). Why do authors publish in predatory journals? Learned Publishing, 31(2), 141-147. https://doi.org/10.1002/leap.1150

Laccourreye, O., Rubin, F., & Maisonneuve, H. (2018). "Predatory" journals threatening the scientific medical press. European Annals of Otorhinolaryngology, Head and Neck Diseases, 135(1), 37-39. https://doi.org/10.1016/j.anorl.2017.08.003

Laine, C., & Winker, M. A. (2017). Identifying predatory or pseudo-journals. Biochemia Medica, 27(2), 285-291. https://doi.org/10.11613/BM.2017.031

Massachusetts Institute of Technology. (2015). How three MIT students fooled the world of scientific journals. Phys.org. https://phys.org/news/2015-04-mit-students-world-scientific-journals.html

McLeod, A., Savage, A., & Simkin, M. G. (2018). The ethics of predatory journals. Journal of Business Ethics, 153(1), 121-131. https://doi.org/10.1007/s10551-016-3419-9

Memon, A. R. (2018). How to respond to and what to do for papers published in predatory journals. Science Editing, 5(2), 146-149. https://doi.org/10.6087/kcse.140

Murphy W. F. (2020). The Informing Science Institute: The informing system of a transdiscipline. Informing Science: The International Journal of an Emerging Transdiscipline, 23, 165-209. https://doi.org/10.28945/4674

Murphy, W. F., Sanchez-Murphy, S., Buettner, R., & Gill, T.G. (2015). Case study of a complex informing system: Joint Interagency Field Experimentation (JIFX). Informing Science: The Journal of an Emerging Transdiscipline, 18, 63-109. https://doi.org/10.28945/2289

Nahai, F. (2015). The rise of predatory journals: What difference does it make? Aesthetic Surgery Journal, 35(8), 1042-1043. https://doi.org/10.1093/asj/sjv085

Oermann, M. H., Nicoll, L. H., Chinn, P. L., Ashton, K. S., Conklin, J. L., Edie, A. H., Amarasekara, S., & Williams, B. L. (2018). Quality of articles published in predatory nursing journals. Nursing Outlook, 66(1), 410. https://doi.org/10.1016/j.outlook.2017.05.005

Olivarez, J. D., Bales, S., Sare, L., & vanDuinkerken, W. (2018). Format aside: Applying Beall's criteria to assess the predatory nature of both OA and non-OA library and information science journals. College & Research Libraries, January, 52-67. https://doi.org/10.5860/crl.79.1.52

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. Science 349(6251), aac4716. https://doi.org/10.1126/science.aac4716

Petrişor, A. I. (2016). Evolving strategies of the predatory journals. Malaysian Journal of Library & Information Science, 21(1), 1-17. https://doi.org/10.22452/mjlis.vol21no1.1

Pfeffer, J. (2007). A modest proposal: How we might change the process and product of managerial research. Academy of Management Journal, 50(6), 1334-1345. https://doi.org/10.5465/amj.2007.28166117

Pyne, D. (2017). The rewards of predatory publications at a small business school. Journal of Scholarly Publishing, 48(3), 137-160. https://doi.org/10.3138/jsp.48.3.137

Retraction Watch. (2013). Oh the irony: Business ethics journal paper retracted for plagiarism. https://retractionwatch.com/2013/03/08/oh-the-irony-business-ethics-journal-paper-retracted-for-plagiarism/

Richtig, G., Berger, M., Lange-Asschenfeldt, B., Aberer, W., & Richtig, E. (2018). Problems and challenges of predatory journals. Journal of the European Academy of Dermatology and Venereology, 32(9), 1441-1449. https://doi.org/10.1111/jdv.15039

Roberts, J. (2016a). Predatory journals: Illegitimate publishing and its threat to all readers and authors. The Journal of Sexual Medicine, 13(12), 1830-1833. https://doi.org/10.1016/j.jsxm.2016.10.008

Roberts, J. (2016b). Predatory journals: Think before you submit. Headache: The Journal of Head and Face Pain 56(4), 618-621. https://doi.org/10.1111/head.12818

SACSCOC (2017). The principles of accreditation: Foundations for quality enhancement. https://sacscoc.org/app/uploads/2019/08/2018PrinciplesOfAcreditation.pdf

Shamseer, L., Moher, D., Maduekwe, O., Turner, L., Barbour, V., Burch, R., Clark, J., Galipeau, J., Roberts, J. & Shea, B. J. (2017). Potential predatory and legitimate biomedical journals: can you tell the difference? A cross-sectional comparison. BMC medicine, 15(1), article 28. https://doi.org/10.1186/s12916-017-0785-9

Sharma, H., & Verma, S. (2018). Predatory journals: the rise of worthless biomedical science. Journal of Postgraduate Medicine, 64(4), 226. https://doi.org/10.4103/jpgm.JPGM_347_18

Shen, C., & Björk, B. C. (2015). 'Predatory' open access: A longitudinal study of article volumes and market characteristics. BMC Medicine, 13(1), 230. https://doi.org/10.1186/s12916-015-0469-2

Sonne, C., Ok, Y. S., Lam, S. S., Rinklebe, J., Alstrup, A. K., & Kim, K. H. (2020). First predatory journals, now conferences: The need to establish lists of fake conferences. Science of the Total Environment, 715, 136990. https://doi.org/10.1016/j.scitotenv.2020.136990

Starbuck, W. H. (2003). Turning lemons into lemonade: Where is the value in peer reviews? Journal of Management Inquiry, 12(4), 344-351. https://doi.org/10.1177/1056492603258972

Starbuck, W. H. (2005). How much better are the most-prestigious journals? The statistics of academic publication. Organization Science, 16(2), 180-200. https://doi.org/10.1287/orsc.1040.0107

Strielkowski, W. (2017). Predatory journals: Beall's List is missed. Nature, 544(7651), 416-416. https://doi.org/10.1038/544416b

Strinzel, M., Severin, A., Milzow, K., & Egger, M. (2019). Blacklists and whitelists to tackle predatory publishing: a cross-sectional comparison and thematic analysis. MBio, 10(3). https://doi.org/10.1128/mBio.00411-19

Strong, G. (2019). Understanding quality in research: Avoiding predatory journals. Journal of Human Lactation, 35(4), 661-664. https://doi.org/10.1177/0890334419869912

Twinomurinzi, H., Mzazi, V.Z., & Gill, T.G. (Eds.). (2018). Transforming society using ICT: Contemporary discussion cases from Africa. Informing Science Press.

Xia, J. (2015). Predatory journals and their article publishing charges. Learned Publishing, 28(1), 69-74. https://doi.org/10.1087/20150111

AUTHOR

Grandon Gill is a professor in the Information Systems and Decision Sciences Department of the University of South Florida. He is also the Academic Director of the Doctor of Business Administration Program the Muma College of Business. He is Editor-in-Chief of the Muma Business Review and the past Editor-in-Chief of Informing Science: The ternational Journal of an Emerging Transdiscipline and the Journal of IT Education: Discussion Cases, also serving as a Governor and Fellow of the Informing Science Institute, where he was elected President in 2019. He was also the inaugural recipient of the Zbigniew Award for informing science research.

Instructions for Authors

Essentials for Publishing in this Journal

1 Submitted articles should not have been previously published or be currently under consideration for publication elsewhere.

2 Conference papers may only be submitted if the paper has been completely re-written (taken to mean more than 50%) and the author has cleared any necessary permission with the copyright owner if it has been previously copyrighted.

3 All our articles are refereed through a double-blind process.

4 All authors must declare they have read and agreed to the content of the submitted article and must sign a declaration correspond to the originality of the article.

Submission Process

All articles for this journal must be submitted using our online submissions system. http://enrichedpub.com/ . Please use the Submit Your Article link in the Author Service area.

Manuscript Guidelines

The instructions to authors about the article preparation for publication in the Manuscripts are submitted online, through the e-Ur (Electronic editing) system, developed by **Enriched Publications Pvt. Ltd**. The article should contain the abstract with keywords, introduction, body, conclusion, references and the summary in English language (without heading and subheading enumeration). The article length should not exceed 16 pages of A4 paper format.

Title

The title should be informative. It is in both Journal's and author's best interest to use terms suitable. For indexing and word search. If there are no such terms in the title, the author is strongly advised to add a subtitle. The title should be given in English as well. The titles precede the abstract and the summary in an appropriate language.

Letterhead Title

The letterhead title is given at a top of each page for easier identification of article copies in an Electronic form in particular. It contains the author's surname and first name initial .article title, journal title and collation (year, volume, and issue, first and last page). The journal and article titles can be given in a shortened form.

Author's Name

Full name(s) of author(s) should be used. It is advisable to give the middle initial. Names are given in their original form.

Contact Details

The postal address or the e-mail address of the author (usually of the first one if there are more Authors) is given in the footnote at the bottom of the first page.

Type of Articles

Classification of articles is a duty of the editorial staff and is of special importance. Referees and the members of the editorial staff, or section editors, can propose a category, but the editor-in-chief has the sole responsibility for their classification. Journal articles are classified as follows:

Scientific articles:

1. Original scientific paper (giving the previously unpublished results of the author's own research based on management methods).

2. Survey paper (giving an original, detailed and critical view of a research problem or an area to which the author has made a contribution visible through his self-citation);

3. Short or preliminary communication (original management paper of full format but of a smaller extent or of a preliminary character);

4. Scientific critique or forum (discussion on a particular scientific topic, based exclusively on management argumentation) and commentaries. Exceptionally, in particular areas, a scientific paper in the Journal can be in a form of a monograph or a critical edition of scientific data (historical, archival, lexicographic, bibliographic, data survey, etc.) which were unknown or hardly accessible for scientific research.

Professional articles:

1. Professional paper (contribution offering experience useful for improvement of professional practice but not necessarily based on scientific methods);
2. Informative contribution (editorial, commentary, etc.);
3. Review (of a book, software, case study, scientific event, etc.)

Language

The article should be in English. The grammar and style of the article should be of good quality. The systematized text should be without abbreviations (except standard ones). All measurements must be in SI units. The sequence of formulae is denoted in Arabic numerals in parentheses on the right-hand side.

Abstract and Summary

An abstract is a concise informative presentation of the article content for fast and accurate Evaluation of its relevance. It is both in the Editorial Office's and the author's best interest for an abstract to contain terms often used for indexing and article search. The abstract describes the purpose of the study and the methods, outlines the findings and state the conclusions. A 100- to 250-Word abstract should be placed between the title and the keywords with the body text to follow. Besides an abstract are advised to have a summary in English, at the end of the article, after the Reference list. The summary should be structured and long up to 1/10 of the article length (it is more extensive than the abstract).

Keywords

Keywords are terms or phrases showing adequately the article content for indexing and search purposes. They should be allocated heaving in mind widely accepted international sources (index, dictionary or thesaurus), such as the Web of Science keyword list for science in general. The higher their usage frequency is the better. Up to 10 keywords immediately follow the abstract and the summary, in respective languages.

Acknowledgements

The name and the number of the project or programmed within which the article was realized is given in a separate note at the bottom of the first page together with the name of the institution which financially supported the project or programmed.

Tables and Illustrations

All the captions should be in the original language as well as in English, together with the texts in illustrations if possible. Tables are typed in the same style as the text and are denoted by numerals at the top. Photographs and drawings, placed appropriately in the text, should be clear, precise and suitable for reproduction. Drawings should be created in Word or Corel.

Citation in the Text

Citation in the text must be uniform. When citing references in the text, use the reference number set in square brackets from the Reference list at the end of the article.

Footnotes

Footnotes are given at the bottom of the page with the text they refer to. They can contain less relevant details, additional explanations or used sources (e.g. scientific material, manuals). They cannot replace the cited literature.
The article should be accompanied with a cover letter with the information about the author(s): surname, middle initial, first name, and citizen personal number, rank, title, e-mail address, and affiliation address, home address including municipality, phone number in the office and at home (or a mobile phone number). The cover letter should state the type of the article and tell which illustrations are original and which are not.

Note