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Research Paper

Metadiscursive Nouns in Iranian Scholars' Research Articles: Disciplinary and Gender-based Variations

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Abstract

Academic discourse is the collaborative interaction within academic communities, primarily aimed at convincing readers that the writers' arguments are valid. Despite the fact that nouns are frequently used in academic writing, the rhetorical functions of nouns have received limited attention in academic writing analysis. This research sets out to: (1) investigate the frequency of Metadiscursive Nouns (MNs) in Iranian scholars' research articles, and (2) compare MN usage across academic disciplines and genders. In this corpus-based study, 40 articles from the fields of Applied Linguistics, Psychology, Medicine, and Chemistry were carefully selected and analyzed based on Jiang and Hyland's (2016) MNs taxonomy. Chi-square analyses revealed significant differences across disciplines and genders, with generally weak effect sizes. The findings revealed gender-based disparities, with male scholars using MNs more frequently in soft disciplines (78.4%) compared to female scholars (69.6%), while female scholars (30.4%) exceeded male researchers (21.6%) in MN usage in hard disciplines. The results also indicated that MN usage differed significantly across disciplines, with the highest frequencies observed in Linguistics and Psychology, despite the relatively small effect size. This research underscores the impact of disciplinary norms and gender on MNs' selection and usage in academic writing, providing valuable insights for teaching academic writing skills, developing instructional materials, and conducting academic discourse analysis.

Keywords: Metadiscursive Nouns, Disciplinary Variation, Gender Variation, Research Articles, Iranian Scholars.

Over the last few decades, academic writing has attracted ongoing scholarly attention, confirming its position within the broader academic discourse (Jiang & Hyland, 2016). Concurrently, the investigation of social interaction in academic writing has gained significant attention, underscoring how each written work not only reflects the author's identity but also fosters an engagement with the reader (Hyland, 2002). This interactive exchange allows authors to express their intended meanings, which readers subsequently interpret through the written language (Forutan & Nasiri, 2011).

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To comprehend the significance of academic writing, it is essential to delve into topics such as discourse, discourse analysis, and metadiscourse. Discourse analysis, introduced by Zellig Harris in 1952, involves analyzing language in use, highlighting its dual role in shaping and being shaped by people (Paltridge, 2012). Metadiscourse, on the other hand, has gained prominence as a way to understand the rhetorical approaches employed in academic writing, particularly in facilitating reader-writer interaction (Hyland, 2005a).

Metadiscursive Nouns (MNs), also known as various nouns like 'general nouns' and 'shell nouns,' represent a crucial but often overlooked aspect of metadiscourse. They are strategically utilized to characterize entities, delineate attributes, and express relations, classified into four categories: text, event, discourse, and cognition, with attributes including quality, manner, and status (Jiang & Hyland, 2016). As Hyland (2005a) suggests, MNs play a dual role, both interactive and interactional, in improving how writers connect with their audience. These nouns help the writer to understand the information connections within the text.

Various studies have examined MNs across different contexts, such as their occurrence in soft and hard disciplines (Jiang & Hyland, 2016), their use in abstracts to frame arguments (Jiang & Hyland, 2017), and their comparison between L1 and L2 essays (Tahara, 2020). Additionally, research has explored MNs in the context of doctoral dissertations (Jin & Shin, 2020) and investigated their role in argumentation essays (Tahara, 2022).

In the last ten years, interest in academic writing and the ways writers engage with their readers has grown considerably, offering diverse perspectives on the subject. As Hyland appropriately observes, "social interactions in academic writing emerge as writers' endeavor to anticipate potential objections to their persu4asive intentions" (Hyland, 2004, p.13).

Building upon this foundation, Jiang and Hyland (2017) delve deeper into the concept, asserting that MNs serve as "rhetorical tools facilitating textual interaction." In essence, they recognize readers as active participants within the written discourse, emphasizing the interplay of ideas. MNs, therefore, emerge as a pivotal component of metadiscourse, enabling authors to create a coherent narrative and shape their perspective. They act as bridges, fostering communication between authors and readers in academic writing, effectively serving both textual and interpersonal functions. In essence, MNs establish connections with additional information, whether internal or external to the text (Jiang & Hyland, 2016). Put simply, they enhance authors' capacity to logically structure their ideas, facilitating readers' comprehensive understanding of the interconnected information.

Given the essential role of abstract nouns in fostering cohesion within academic writing, it follows that MNs, a subset of abstract nouns that specifically pertain to discourse organization and reader comprehension, hold a vital place within academic discourse (Jiang & Hyland, 2016). Furthermore, while abstract nouns maintain a consistent meaning relative to their context, MNs exhibit both a stable meaning and a contextual, pragmatic dimension. They aid authors in pinpointing elements within the immediate context and shaping readers' responses to this material.

In conclusion, it becomes evident that a more comprehensive exploration of MN usage across diverse genres, disciplines, languages, cultures, and genders is imperative within the academic realm. Such investigations promise to enrich our understanding of academic discourse and its intricate dynamics.

Literature review

Theoretical background

Metadiscourse (MD) has garnered increasing attention as a prominent linguistic and pragmatic aspect of academic writing. In today's globalized academic landscape, scholars adhere to established structural conventions and linguistic norms, particularly in English as the lingua franca, to solidify their standing within academic communities (Yuvayapan & Yakut, 2022). Within the realm of academic genres, MD serves as a valuable tool for fostering scholarly awareness, given its distinctive linguistic characteristics. However, a consistent oversight within MD frameworks is the neglect of nouns. Flowerdew (2015) points out that nouns play a central role in shaping discourse, as they help writers clearly express what they seek to convey. Recognizing the key function of nouns and nominalization in scholarly writing, the researcher delves into the theoretical foundation of MNs, providing a clear definition and functional classification. Lastly, we review prior studies concerning MNs in the academic realm.

In examining the significance of MD, Jiang and Hyland (2016) emphasize its role as a "neglected feature of metadiscourse." This section provides an overview of MD and its importance in academic writing, followed by a deeper exploration of MNs. MD is a crucial linguistic tool across academic genres for establishing credibility and communication (Harris, 1959; Hyland, 2005a, 2009, 2010; Vande Kopple, 1985; Williams, 1981). It encompasses a range of rhetorical devices that connect the author, the text, and the reader, facilitating interaction and conveying interactional meanings (Hyland, 2019).

Ädel (2006) distinguishes between a broad and a narrow perspective of MD. The wide view sees MD as a means of constructing coherent texts and expressing ideas, while the narrow view focuses on how discourse reflects itself (Ädel & Mauranen, 2010). MD has an important impact on shaping scholarly communication and is essential for genre-specific writing. Swales (1981) introduced the term "metadiscourse," highlighting how language guides readers through texts and conveys the author's intent. It reflects ongoing investigations into language's operation and impact, influenced by various academic fields and theoretical frameworks. MD is a linguistic manifestation of sociocultural reality, shaping message interpretation, author intent, and text content (Cuevas-Alonso & Míguez-Álvarez, 2021). It allows authors to analyze their text's content, rhetorical approach, and perspective, meeting readers' demands for explanation and interaction (Keshavarz & Kheirieh, 2011).

In the realm of academic research articles (RAs), MD investigations have gained popularity, examining various sections like abstracts, introductions, results, discussions, and conclusions

(Holmes, 1997; Hyland, 2005a; Jalilifar, 2014; Williams, 1981; Yang & Allison, 2003). Context plays a vital role in MD use, as it varies across disciplines, languages, and genres (Crismore, 1989; Hyland, 2005a; Martín, 2003). MD's context-dependent nature highlights its role as a tool for diverse disciplinary communities and linguistic societies, utilized for displaying research, indicating arguments, and establishing reader interactions (Ädel, 2006).

Metadiscursive Nouns: Origin, Concept, and Function

Scholars have employed a range of terms to refer to Metadiscursive Nouns (MNs), namely anaphoric nouns, carrier nouns, signaling nouns, and shell nouns, emphasizing distinct aspects of their function (Flowerdew, 2003; Francis, 1986; Ivanič, 1991; Schmid, 2000).

The theoretical foundation for MNs is rooted in the concept of cohesion in discourse, drawing from the general nouns model proposed by Halliday and Hasan (1976). Cohesion refers to linguistic devices that create connections within text. MNs can be considered a specific manifestation of general nouns, possessing distinct features and functions. A recent reconceptualization of Metadiscourse (MD) features includes Metadiscursive Nouns (MNs) as a central element, emphasizing their role in structuring discourse and highlighting research relevance. These nouns help establish claims, package information, and convey disciplinary legitimacy, especially within research abstracts (Jiang & Hyland, 2016, 2017; Prados, 2018). Moreover, MNs serve a dual function, providing cohesion and stance-taking in a text, directing authors to specific content, and guiding readers' interpretation (Zhang, Zhu, & Lu, 2023).

Esfandiari and Allaf-Akbary (2022) note that MNs, such as "study," "research," "analysis," and "argument," are integral to academic writing, organizing information, and supporting knowledge claims. They enable scholars to interact with their audience, signal their participation in discourse processes, and establish authority in their discipline. Iranian scholars, like their global counterparts, employ MNs to enhance text coherence and express their perspectives (Jiang, 2015; Jiang & Hyland, 2017, 2021). In summary, MNs play a vital role in academic communication, aiding comprehension and improving academic performance.

Function-Oriented Typology of Metadiscursive Nouns

According to Jiang and Hyland (2016), MNs fulfill three key roles: denoting entities, depicting entity characteristics, and examining connections among entities (see Table 1). Nouns serve as linguistic representations of entities, expressing the author's sentiments and perspectives regarding texts, events, discourse, and cognition elements within the text. For example, nouns related to texts include "paper," "research," and "study." Event-related nouns express actions, ongoing developments, or concrete experiences, with frequently cited examples including "effort," "experience," "process," and "interaction." Discourse-related nouns describe speech acts and propositions, like "claim," "discussion," and "instruction." Lastly, cognition-related nouns refer to opinions, viewpoints, and cognitive components, including "belief," "desire," "judgment," and "understanding".

Nouns attributing characteristics to entities convey the writer's assessments of various aspects, including quality, status, and manner. Quality-related nouns evaluate something as positive or negative, such as "difficulty," "importance," and "success". Manner-related nouns describe conditions, development of actions, and states of affairs, including spatial and temporal dimensions, methods, and frequency. Nouns like "setting," "time," "approach," and "context" are used to convey these aspects. Additionally, MNs can express the writers' evaluations of modality, including aspects such as certainty, responsibility, and capability, as seen in nouns like "probability," "duty," and "capacity". Furthermore, MNs related to relations like "difference," "relationship," and "result" indicate how an author perceives interactions or information relationships. This model can serve as a benchmark for analyzing authors' use of MNs in stance representation, as demonstrated in prior studies (e.g., Işk-Taş, 2018; Jiang & Hyland, 2016, 2017; Prados, 2018).

Table 1.
Functional Classification of Metadiscursive Nouns (Jiang & Hyland, 2016)

Entity	Description	Examples
Text	Concrete metatext	*Report, paper, extract*
Event	Events, processes, and evidential cases	*Report, paper, extract*
Discourse	Verbal propositions and speech acts	*Argument, claim, conclusion*
Cognition	Cognitive beliefs and attitudes	*Decision, idea, belief, doubt*
Attribute	**Description**	**Examples**
Quality	Traits that are admired or criticized, valued, or depreciated	*Advantage, difficulty, value*
Manner	Circumstances of actions and state of affairs	*Time, method, way, extent*
Status	Epistemic, deontic, and dynamic modality	*Ability, capacity, possibility, potential*
Relation	**Description**	**Examples**
Cause-effect, difference, etc.	Cause-effect, difference, relevance	*Reason, result, difference*

Jiang and Hyland initiated a significant study in 2016, delving into the metadiscursive roles of nouns. They analyzed 120 research articles drawn from six distinct disciplines, spanning from electrical engineering to sociology, including cell biology, applied linguistics, marketing, and medicine, which are categorized as soft and hard disciplines. Their research highlighted the frequent occurrence of the "metadiscursive nouns + post-nominal clause" pattern. The results of this study indicated a clear contrast across soft and hard disciplines, with MNs being more prevalent (approximately 83%) in soft fields.

In another study, Jiang and Hyland (2017) analyzed 240 article abstracts from six fields (philosophy, marketing, applied linguistics, medicine, electronic engineering, and physics), all published after 2010. The usage of MNs was explored concerning the five conventional sections of academic abstracts, which generally consist of background, objective, methodology, findings, and final remarks. The findings revealed that writers commonly employ MNs to structure their arguments, frame their research, and emphasize its significance within their discipline.

In 2017, Tahara conducted research focusing on the utilization of MNs to assess the quality of L2 English argumentative essays written by Japanese students. The research involved comparing the usage of 33 shell nouns (as defined by Schmid, 2000) in two corpora: the US sub-corpus of LOCNESS, containing writing by native English speakers, and the Japanese sub-corpus of ICLE, representing Japanese writing in English as a foreign language. Tahara's analysis of MNs indicated that non-native speakers often exhibit variations in their writing, particularly in their use of shell nouns. The study found distinct practices in the usage of these nouns between the two student groups, with the most significant differences observed in their use of anaphoric references. For example, Japanese students tend to use nouns more frequently for such purposes compared to their American counterparts. These lexical choices align with the distinct approaches to constructing discourse and making arguments within each corpus.

Işık-Taş (2018) noted the limited exploration of constructing a nominal stance in academic texts despite the importance of effective stance in academic writing. This study examined stance nouns in L2 writings as answers to IELTS Academic Module Writing Task 2 through the lens of Jiang and Hyland's (2016) framework, which classifies them based on their functions. This analysis investigated how learners at different proficiency levels—corresponding to IELTS bands 4, 6, and 8—employed stance nouns in their writing. The levels were roughly aligned with categories of basic, intermediate, and advanced users. The findings highlighted noticeable distinctions in how stance nouns were employed across the three groups. Learners at the highest level (band 8) not only demonstrated a broader lexical range in their stance noun usage but also showed a higher tendency to incorporate complex grammatical patterns, such as noun + complement clauses, cognitive-related nouns, and the use of modifiers before the noun, compared to those at lower proficiency levels. This suggests that advanced academic writing is characterized by the development of nominal stances.

In addition to this, Yuvayapan (2019) analyzed MN usage in 60 English-language doctoral dissertations written by American and Turkish authors, using Jiang and Hyland's (2016) MNs taxonomy. Results revealed that American and Turkish writers used MNs in a similar manner, both in terms of overall and categorical usage. Furthermore, the 'entity' category was found to be the most prevalent in both corpora.

However, Jin and Shin (2020) investigated MN usage in two academic writing genres: Ph.D. dissertations and research articles authored by Chinese novice and expert writers, respectively. They collected data from 80 research papers from 8 journals and the conclusion sections of 20

randomly selected Ph.D. dissertations from 8 universities. The study found that anaphoric and cataphoric patterns were less prevalent in doctoral dissertations compared to research articles. Additionally, it highlighted the significant rhetorical role played by MNs in scholarly discourse.

In a 2020 study, Tahara compared the use of MNs in first and second language essays, relying on the Louvain Corpus of Native English and the International Corpus of Learner English as data sources. The findings revealed significant differences between the two sets of essays. US writers tended to make direct assertions supported by facts and justification. In contrast, Japanese writers preferred discussing their subjects individually and concluding with a statement.

In a study by Huang and Xu (2020), the trend of using MNs in academic discourse to summarize and foreshadow content was explored. However, the interpersonal functions of MNs in scholarly communication across diverse cultural backgrounds received less attention. They investigated the interpersonal function, including stance construction, within MNs using a corpus of sixty scholarly articles authored by both Chinese and English writers, focusing on the "metadiscursive nouns + that complement" pattern. The results indicated that Chinese authors generally employed a more limited range of nouns across different categories when constructing discourse. This was largely attributed to their limited English proficiency and adherence to local academic conventions.

Moreover, Jiang and Hyland (2021) explored how the utilization of MNs has changed in journal articles across four distinct fields: two soft disciplines—applied linguistics and sociology—and two hard disciplines—electrical engineering and biology. Their results showed that the "this + noun" structure was commonly preferred across all four disciplines. In summary, soft disciplines tended to use the "noun + post-modifying clause" construction more frequently, whereas hard sciences leaned toward "N + be + clauses".

A study by Liu and Chen (2022) presented a cross-cultural comparison based on 40 English abstracts authored by students in the field of music in China and the US for their doctoral dissertations, published between 2018 and 2020. The analysis drew upon two datasets: one consisting of abstracts written by Chinese students (Corpus CA) and the other composed of those by English-speaking students (Corpus EA). Results indicated that L1 English-speaking music students used MNs more frequently in their doctoral dissertation abstracts than Chinese music students. Both Chinese and American students preferred the 'Determiner + N' sentence when using entity nouns.

Tahara (2022) analyzed argumentation essays by Japanese and American students to understand the difficulties encountered by Japanese learners when using MNs in their second language (L2) writing. L2 essays were from the International English Corpus, and L1 essays were from the Louvain Corpus of Native English essays. The study focused on the textual function of MNs, particularly high-frequency nouns like "problem," "research," "thing," "fact," "idea," and "decision," as examined in Tahara's (2017) study. Results showed that Japanese students had difficulty with English rhetorical structures, establishing meaningful connections,

and describing information. This suggests challenges in using specific English rhetorical structures and creating meaningful connections while focusing on content description.

Apart from this, Yuvayapan and Yakut (2022) explored how nouns were employed in M.A. and Ph.D. theses authored by both native and non-native speakers of English, highlighting cross-cultural variation in their academic writing practices. However, both groups made similar rhetorical choices when incorporating MNs into their M.A. and Ph.D. theses.

In his book 'Metadiscursive Nouns: Interaction and Persuasion in Disciplinary Writing (Jiang, 2022), the aim was to investigate the role of MNs in writer-reader interaction within academic discourse. This research analyzed a dataset of 160 research articles from eight fields, including physics, electronic engineering, medicine, cell biology, applied linguistics, sociology, marketing, and philosophy. The research found that authors did not consistently apply the five patterns and often employed different nouns for each pattern. The most dominant pattern observed was the 'determiner + noun' structure, in which the word 'case' appeared most frequently. Additionally, the study revealed that in soft disciplines, authors utilized all five patterns to diversify their linguistic devices, enhancing discourse and effectively supporting a broad readership.

As noted by Zhang, Zhu, and Lu (2023), research on the "this + N" pattern in argumentative essays has mainly focused on L1 and L2 author comparisons. However, its use within research article abstracts in scientific fields, particularly chemistry, mathematics, and physics, has not been investigated for cross-cultural variations in expressing stance. To address this research gap, they examined the use of the "this/these + N" pattern in two self-constructed corpora: English abstracts from internationally published journal papers (EIC) and English abstracts from Chinese-published journal articles (ECC). They applied the established five-move analysis framework, including introduction, purpose, methods, results, and conclusion, as used by Hyland (2004) and Dos Santos (1996), and demonstrated in earlier research conducted by Jiang and Hyland (2017) and Prados (2018) to effectively analyze the organizational patterns of research article (RA) abstracts. The results revealed that L1 and L2 authors exhibited similar structures in using this pattern to express their stance. However, L2 authors employed the "these + N" pattern less frequently and diversely than L1 authors, even though they used the "this + N" pattern as frequently as their L1 counterparts.

To conclude, this study delves into Iranian scholars' linguistic choices through the lens of MNs, contributing to a deeper comprehension of the intricate interplay between academic discourse, disciplinary norms, and gender influences in the Iranian academic context. A clear gap in prior research emerges: despite extensive studies on nouns in academic genres, few have examined their metadiscursive functions in Iranian scholarship, and none have systematically considered the combined effects of discipline and gender. Our focus is on identifying disparities in MN distribution in Iranian scholars' research articles to bring attention to and fill this overlooked aspect. Given the limited scope of previous interdisciplinary investigations within Iran, our research assumes added significance, enhancing our understanding of MNs.

Additionally, we explore potential gender-related variations in MN usage, shedding light on the evolving landscape of gender representation in academia. Examining MN use in Iranian scholars' research articles provides valuable insights into the convergence of disciplinary conventions and gender dynamics.

Due to the negligence of the rhetorical functions of these MNs in Iranian disciplinary and gender-based writing, this study will seek an answer to the following questions:

1) What are the most frequently used Metadiscursive Nouns in Iranian scholars' research articles in the selected disciplines?

2) Are there any significant differences between the frequencies of Metadiscursive Nouns in Iranian scholars' research articles in the selected disciplines?

3) Are there any significant differences between the frequencies of Metadiscursive Nouns in Iranian male-and female-authored research articles in the selected disciplines?

Method

This quantitative study delves into research articles authored by Iranian scholars, aiming to provide a comprehensive insight into their written communication in published research. Forty articles were meticulously selected from a range of disciplines, spanning from soft-knowledge fields such as applied linguistics and psychology to hard-knowledge disciplines such as medicine and chemistry, as inspired by Becher and Trowler (2001). This diverse disciplinary representation offers a deep understanding of MN usage across academic realms. A deliberate approach ensured an equal distribution of ten research articles between male and female authors, enabling a precise examination of potential gender-related linguistic tendencies. Our article selection timeframe covers a decade, from 2013 to 2023, encompassing significant shifts in scholarly production and academic writing practices. This temporal scope enables the observation of how MNs have evolved as linguistic elements in Iranian disciplinary research papers over the past decade, thereby facilitating meaningful insights from the data.

The implementation of stratified random sampling, a well-established methodology in academic research, ensures that subgroups within the larger population of research articles are proportionally represented in the study sample, drawing inspiration from Mackey and Gass (2015, p.172). Consequently, the resulting selection provides a well-rounded representation of Iranian scholars' contributions to various academic disciplines.

This study aimed to uncover the nuances of MN usage in Iranian disciplinary writing, employing a model proposed by Jiang and Hyland (2016) to explore gender-based variations within specific disciplinary domains. By examining how male and female authors employed MNs in terms of frequency and type, this innovative approach sought to reveal hidden layers of authorial stance and scholarly interaction within Iranian disciplinary writing. In essence, the research aimed to illuminate the understudied dynamics surrounding MN utilization, enriching our understanding of how linguistic choices intersect with authorship and disciplinary conventions.

To identify MNs in Iranian disciplinary writing, the study utilized digital tools to examine a corpus of research articles specifically assembled for this purpose. This investigation focused on the strategic use of MNs in scholarly discourse, shedding light on their role in conveying authorial stance and establishing scholarly credibility. Furthermore, it aimed to decode the intricate language choices within diverse disciplines and genders, uncovering hidden insights that enrich our understanding of the interplay between language and academia.

The articles selected by the researchers were systematically analyzed in the constructed corpus, employing the model by Jiang and Hyland (2016). This analysis involved identifying MNs across disciplinary and gender variations. The MNs were classified into three main categories (Entity, Attribute, and Relation) and eight subcategories (Text, Event, Discourse, and Cognition for Entity; Quality, Status, and Manner for Attribute; and Relation), as per their proposed list. To locate MNs in the selected articles, a manual search was conducted within each article's PDF file. A coding system was developed, using different colors to represent various noun categories, and the MNs were highlighted, underlined, and counted. The results were recorded in designated tables. These steps were meticulously applied to all 40 articles from the four target fields. The analysis covered all components of these research papers, including titles, visuals (tables and figures), direct quotations, and paraphrased content, along with each major section, such as the abstract, opening segment, review of literature, methodology, findings, discussion, and conclusion. After identifying these nouns in the corpus, their raw frequencies were normalized to compare them effectively, ensuring that article lengths did not skew the measurements. The collected data were input into Microsoft Excel for analysis, using data visualization to uncover patterns in MN deployment.

A color-coding system, recommended by the researchers, organized the data, making connections and disparities visually apparent. This graphical representation aimed to transcend raw numbers, encouraging nuanced interpretations and hypotheses. To enhance the reliability and consistency of the MN coding, intra-coder reliability was established through a two-stage manual coding process. All 40 articles were coded twice by the same researcher, with a 30-day interval between coding stages. This procedure ensured careful cross-checking and minimized potential errors in identifying and categorizing MNs across disciplines and genders. Following this reliability check, the frequencies, percentages, and standardized residuals were calculated, and statistical significance was assessed using the Chi-Square test, providing a solid foundation for drawing conclusions about MN usage across disciplines and between male and female scholars.

Results

This study aimed to analyze the most frequently used Metadiscursive Nouns (MNs) in research articles authored by Iranian scholars in the disciplines of linguistics, psychology, medicine, and chemistry. The analysis relied on frequencies, percentages, and standardized

residuals (Std. Residual), with the latter being a standardized index used to compare cell frequencies for significant differences.

Table 2 presents MN frequencies, percentages, and Std. Residuals for male and female scholars in soft and hard disciplines. In soft disciplines, male scholars used MNs significantly more (78.4%) than female scholars (69.6%), with a Std. Residual of 3.2, indicating a significant deviation. Conversely, in hard disciplines, female scholars (30.4%) surpassed male researchers (21.6%) in MN usage. The Std. Residual of 5.8, exceeding 1.96, signified significant overuse of MNs by female researchers compared to male scholars.

Table 2.
Frequencies, Percentages, and Standardized Residuals for MNs in Two Broad Disciplines by Gender

			Type		Total
			Soft	Hard	
Gender	Male	N	3497	964	4461
		%	78.4%	21.6%	100.0%
		Std. Residual	3.2	-5.4	
	Female	N	2714	1185	3899
		%	69.6%	30.4%	100.0%
		Std. Residual	-3.4	5.8	
Total		N	6211	2149	8360
		%	74.3%	25.7%	100.0%

Table 3 shows MN frequencies, percentages, and Std. Residuals for three MN categories (attribute, entity, relation) in the disciplines of chemistry, linguistics, medicine, and psychology. Chemistry exhibited the highest attribute category percentage (46.4%, Std. Residual = 9.3 > 1.96), whereas medicine had the lowest (23.4%, Std. Residual = -4 > -1.96). Linguistics had the highest entity category percentage (59.2%, Std. Residual = 4.8 > 1.96), while chemistry had the lowest (43.1%, Std. Residual = -4.2 > -1.96). In terms of the relation category, medicine had the highest percentage (29.3%, Std. Residual = 10.6 > 1.96), while chemistry had the lowest (10.5%, Std. Residual = -4.7 > -1.96).

Table 3.
Frequencies, Percentages, and Standardized Residuals for Categories of MNs by Disciplines

			Categories of MNs			**Total**
			Attribute	**Entity**	**Relation**	
Major	Chemistry	Count	404	375	91	870
		% within Major	46.4%	43.1%	10.5%	100.0%
		Standardized Residual	9.3	-4.2	-4.7	
	Linguistics	Count	1003	2261	555	3819
		% within Major	26.3%	59.2%	14.5%	100.0%
		Standardized Residual	-3.6	4.8	-3.7	
	Medicine	Count	299	605	375	1279
		% within Major	23.4%	47.3%	29.3%	100.0%

			Categories of MNs			Total
			Attribute	Entity	Relation	
		Standardized Residual	-4.0	-3.1	10.6	
	Psychology	Count	752	1237	403	2392
		% within Major	31.4%	51.7%	16.8%	100.0%
		Standardized Residual	1.8	-1.2	-.2	
Total		Count	2458	4478	1424	8360
		% within Major	29.4%	53.6%	17.0%	100.0%

Table 4 displays MN frequencies and percentages in linguistics, psychology, medicine, and chemistry. In linguistics, the top MNs were "study" (24.8%), "result" (13.4%), and "goal" (12.5%), while the least frequent ones were "effect" (6.1%), "activity," and "experience" (both 5.8%). This table also reveals MN frequencies in psychology. The top MNs were "study" (23.6%), "result" (14.1%), and "method" (13.2%), while the least frequent ones were "response" (6.0%), "hope" (5.9%), and "effect" (4.9%).

In medicine (Table 4), the top MNs were "study" (25.6%), "effect" (24.2%), and "result" (11.9%), while the least frequent were "time" (4.3%), "difference" (3.9%), and "trial" (3.0%). In chemistry, the top MNs were "structure" (19.2%), "activity" (13.7%), and "method" (11.3%), while the least frequent were "time" (8.3%), "extract" (5.3%), and "scheme" (3.6%).

Table 4.
Frequencies and Percentages for MNs by Disciplines

Linguistics			Psychology			Medicine			Chemistry		
MNs	N	%	MNs	N	%	MNs	N	%	MNs	N	%
Activity	72	5.8	Effect	53	4.9	Case	78	9.9	Activity	68	13.7
Effect	76	6.1	Hope	64	5.9	Difference	31	3.9	Analysis	43	8.7
Experience	72	5.8	Method	144	13.2	Effect	191	24.2	Condition	44	8.9
Goal	156	12.5	Problem	125	11.5	Pattern	46	5.8	Extract	26	5.3
Instruction	97	7.8	Relationship	94	8.6	Procedure	35	4.4	Interaction	54	10.9
Research	78	6.3	Research	68	6.2	Result	94	11.9	Method	56	11.3
Result	167	13.4	Response	65	6.0	Study	202	25.6	Result	50	10.1
Study	309	24.8	Result	154	14.1	Test	54	6.8	Scheme	18	3.6
Test	139	11.1	Study	257	23.6	Time	34	4.3	Structure	95	19.2
Time	81	6.5	Test	67	6.1	Trial	24	3.0	Time	41	8.3
Total	1247	100.0	Total	1091	100.0	Total	789	100.0	Total	495	100.0

Table 5 displays the frequencies, percentages, and Std. Residuals for MN usage across various disciplines. These findings were supported by the results of the Chi-Square Analysis

(Table 6). The results ($\chi 2$ (12) = 220.32, $p < .05$, Cramer's V = .094, indicating a weak effect size) revealed significant differences in MN usage across various disciplines.

As a result, the null hypothesis, which posited that there were no significant differences between the frequencies of MNs in Iranian scholars' research articles across the selected disciplines, was rejected. However, it is important to interpret these findings cautiously, given the weak effect size value of .094.

Table 5.

Frequencies, Percentages, and Std. Residuals for MNs in Research Articles by Disciplines

		Articles					Total
		1	2	3	4	5	
Linguistics	Count	749	951	756	889	474	3819
	%	19.6%	24.9%	19.8%	23.3%	12.4%	100.0%
	Std. Residual	.0	.1	.1	5.4	-6.1	
Psychology	Count	388	638	459	368	539	2392
	%	16.2%	26.7%	19.2%	15.4%	22.5%	100.0%
	Std. Residual	-3.8	1.8	-.6	-4.5	7.4	
Medicine	Count	342	246	267	224	200	1279
	%	26.7%	19.2%	20.9%	17.5%	15.6%	100.0%
	Std. Residual	5.7	-4.0	.9	-1.6	-.7	
Chemistry	Count	162	242	165	145	156	870
	%	18.6%	27.8%	19.0%	16.7%	17.9%	100.0%
	Std. Residual	-.7	1.8	-.5	-1.9	1.1	
Total	Count	1641	2077	1647	1626	1369	8360
	%	19.6%	24.8%	19.7%	19.4%	16.4%	100.0%

Table 6.

Chi-Square Tests for MNs in Research Articles by Disciplines

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	220.321[a]	12	.000
Likelihood Ratio	216.618	12	.000
Linear-by-Linear Association	.003	1	.954
N of Valid Cases	8360		
Cramer's V	.094		.000

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 142.47.

Table 7 shows the results of the Chi-Square Analysis. These results ($\chi 2$ (4) = 100.87, $p < .05$, Cramer's V = .163, indicating a weak effect size) reveal significant differences in the usage of MNs between male and female scholars in the field of linguistics.

Table 7.

Chi-Square Tests for MNs in Research Articles in Linguistics by Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	100.879[b]	4	.000
Likelihood Ratio	103.009	4	.000
Linear-by-Linear Association	.518	1	.472
N of Valid Cases	3819		
Cramer's V	.163		.000

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 187.17.

The findings ($\chi 2$ (4) = 167.78, p < .05, Cramer's V = .265, which signifies a weak effect size) demonstrate noteworthy variations in the MNs utilized by male and female scholars within the field of psychology (Table 8).

Table 8.

Chi-Square Tests for MNs in Research Articles in Psychology by Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	167.784[b]	4	.000
Likelihood Ratio	171.079	4	.000
Linear-by-Linear Association	69.454	1	.000
N of Valid Cases	2392		
Cramer's V	.265		.000

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 182.46.

Table 9 presents the outcomes of the Chi-Square analysis. These results ($\chi 2$ (4) = 131.38, p < .05, Cramer's V = .321, indicating a moderate effect size) reveal substantial distinctions in the MNs employed by male and female scholars within the field of medicine.

Table 9.

Chi-Square Tests for MNs in Research Articles in Medicine by Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	131.383[b]	4	.000
Likelihood Ratio	139.001	4	.000
Linear-by-Linear Association	45.230	1	.000
N of Valid Cases	1279		
Cramer's V	.321		.000

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 91.32.

The last table (Table 10) displays the outcomes of the Chi-Square analysis. These results ($\chi 2$ (4) = 23.63, p < .05, Cramer's V = .165, indicating a weak effect size) reveal noteworthy distinctions in the MNs utilized by male and female scholars within the field of chemistry.

Table 10.

Chi-Square Tests for MNs in Research Articles in Chemistry by Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.636[b]	4	.000
Likelihood Ratio	23.849	4	.000
Linear-by-Linear Association	11.542	1	.001
N of Valid Cases	870		
Cramer's V	.165		.000

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 63.33.

Based on the obtained results, the null hypothesis that there were no significant differences between the frequencies of MNs in Iranian male-and female-authored research articles in the selected disciplines was rejected.

Discussion

This study primarily supports the notion of the universality of Metadiscourse (MD), as initially proposed by Bartholomae in 1986. Indeed, writers use MD as an essential and integral component of their language across various disciplines, genres, languages, cultures, and more. Moreover, the study confirmed the crucial importance of MD elements in academic genres, a notion emphasized by Swales in 1990. Differences were apparent in how they employed specific subcategories of MNs. The final overarching observation centers on how the disciplinary context influences the use of MNs in written texts. Writers from the four disciplines exhibited distinct preferences in using MNs, influenced by factors like the content of their ideas, argument structure, and their target readership. Notably, the differences arising from disciplines and genders resulted in substantial variations in MN usage, surpassing initial expectations.

This study investigated the utilization of MNs in research articles by Iranian scholars in linguistics, psychology, medicine, and chemistry. Male scholars used MNs more in soft disciplines, while female scholars surpassed males in hard disciplines. Overall, female researchers tended to overuse MNs compared to their male counterparts.

Regarding MN categories, chemistry had the highest attribute category percentage (46.4%), and medicine had the lowest (23.4%). Linguistics had the highest entity category percentage (59.2%), whereas chemistry had the lowest (43.1%). Regarding the relation category, medicine had the highest percentage (29.3%), while chemistry had the lowest (10.5%). Chi-Square Analysis confirmed significant differences in MN usage across disciplines, leading to the rejection of the first null hypothesis, which proposed no notable variation between MN frequencies in Iranian scholars' research articles across disciplines. Furthermore, the Chi-Square Analysis revealed notable differences in MNs used by male and female scholars in linguistics, psychology, medicine, and chemistry. Thus, the second null hypothesis was rejected, indicating no significant differences in MN frequencies between Iranian male-and female-authored research articles in these disciplines.

While this study examined only four majors, it shares a commonality with Jiang and Hyland's (2016) research in its focus on the usage of MNs in both soft and hard disciplines, as well as their differences in usage. However, a key distinction lies in the present study's additional emphasis on the gender of research articles' authors, alongside the type of discipline. Moreover, this study aimed to investigate the occurrence of these nouns separately. Furthermore, the current study's purpose aligned with Jiang and Hyland's research conducted in 2017. Both studies have investigated the occurrence of MNs in various sections of research articles; however, the selected disciplines varied in number and type.

Tahara's (2017) research had a distinct focus on argumentative essays as a genre of academic writing. However, this researcher's commendable effort lies in discovering cultural and linguistic differences in the usage of MNs. Although our research does not specifically address the linguistic backgrounds of research article authors, we acknowledge that this factor can significantly influence the employment of MNs in articles authored by researchers from diverse linguistic backgrounds and countries.

Interestingly, this gender-based difference resonates with the observations of Işık-Taş (2018), who noted that more proficient language users employed a wider range of stance nouns and MN structures. While Işık-Taş studied IELTS responses, the implication for academic writing remains: higher rhetorical awareness may correlate with more diverse MN usage. This might suggest that the female authors in the present study, through greater attention to relational and organizational discourse strategies, demonstrated subtle metadiscoursal engagement.

Comparative studies further contextualize our findings. For instance, Yuvayapan (2019) observed similar MN patterns between American and Turkish dissertation writers, with 'entity' nouns dominating both corpora. Our results partly align with this: linguistics (a soft field) showed a dominant use of 'entity' MNs, suggesting that noun choices are strongly influenced by factors such as national background, genre, and discipline.

Moreover, Jin and Shin (2020) found that MN usage varies by expertise and genre, noting fewer frequent anaphoric/cataphoric references in novice writers' dissertations than in expert-authored research articles. Our focus on published research articles supports their conclusion regarding the impact of genre, but adds a new dimension by revealing that gender and disciplinary norms may intersect to shape rhetorical strategies even among expert authors.

Furthermore, studies such as Huang and Xu (2020) emphasize how language background affects MN usage, with Chinese authors showing limited use of interpersonal MNs due to different academic conventions. While our study does not investigate authors' linguistic backgrounds, the gender-based and disciplinary variations we uncovered suggest that internal sociocultural factors—such as academic training, expectations of the readership, and disciplinary writing norms—significantly influence the shaping of discourse.

The disciplinary variation observed in the current study also resonates with Jiang and Hyland's (2021) research, which explored how MNs function across fields representing both soft and hard sciences. Their findings emphasized that writers' rhetorical choices are shaped by

disciplinary norms, which aligns with the present study's observation that the academic field plays a crucial role in shaping the use of metadiscursive nouns in research writing.

Similar to Jin and Chin (2020), Liu and Chen (2022) concentrated on the occurrence of MNs within a specific genre of academic texts, specifically doctoral dissertations. In their work, they also examined the linguistic background, revealing the substantial impact of cultural and linguistic differences on MN usage in academic writing. In our current study, we similarly discovered that factors such as the type of discipline and the gender of research article authors significantly influenced the usage of MNs.

Additionally, our findings raise important questions about academic literacy and discourse socialization among Iranian scholars. The underuse of MNs in certain fields, especially chemistry and medicine, may reflect a limited exposure to international academic writing conventions or a decreased emphasis on authorial presence and rhetorical signaling in those disciplines. This aligns with the observation that Iranian authors may prioritize content accuracy over rhetorical sophistication, particularly in hard sciences, where conciseness and objectivity are often valued.

Finally, while this study focused on four disciplines, its implications are broader. The significant differences in MN usage by gender and discipline suggest that academic writing is more than just a neutral transmission of knowledge but a socially situated practice shaped by the identities and expectations of its authors. These findings call for more explicit instruction in metadiscursive strategies in academic writing curricula, especially for scholars working in less discursively expressive fields.

Conclusion

Academic writing is an active and socially situated form of communication that enables authors not only to share knowledge but also to create a sense of authority and interact with their audience. Through interpersonal interaction, writers assert their expertise by making judgments about elements, attributes, and relationships. This study examined the occurrence and significance of metadiscursive nouns (MNs) and explored how their usage varies across disciplines and genders. In response to the research questions, the findings indicate that the most frequently used metadiscursive nouns differ across disciplines, with 'entity' nouns dominating soft disciplines and 'attribute' and 'relation' nouns appearing more prominently in hard disciplines. MN usage also varies between male and female authors, with male scholars tending to use MNs more frequently in soft disciplines, while female scholars exhibit higher usage in hard disciplines. Additionally, specific MN categories—Entity, Attribute, and Relation—show variations both across disciplines and between genders, reflecting refined rhetorical strategies that writers employ to shape meaning and engage readers in academic discourse.

This research has some significant implications and enhances our theoretical understanding of metadiscourse in academic writing by shedding light on how MNs support interaction between writers and readers in academic texts. It extends current knowledge by emphasizing

how disciplinary norms and gender influence the rhetorical construction of academic texts. In light of these findings, writing instructors can integrate the teaching of MNs into academic writing curricula, focusing on their functions and disciplinary variations to enhance students' rhetorical awareness and writing competence. Furthermore, institutions might consider offering discipline-specific writing workshops that highlight conventional MN patterns, thereby better preparing students for scholarly communication in their fields. In the same fashion, academic journals and publishers could benefit from recognizing disciplinary and gender-based differences in MN usage by offering clearer guidelines that reflect diverse rhetorical norms and linguistic practices.

Limitations are inherent in research, and this study is no exception. The future research could overcome the sample size limitation by including a larger and more diverse set of research articles, offering a broader view of MN usage in academic writing and potentially stronger findings. Longitudinal studies conducted over an extended period could also reveal changes and trends in MN usage, enhancing our understanding of its evolution over time. Further, performing a meta-analysis of existing MN research could consolidate findings and reveal overarching trends and patterns.

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