Original Article

Error analysis of nonnative authors' publications in health-care journals: A descriptive study

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Abstract:

BACKGROUND: As nonnative speakers of English, Iranian health researchers/authors often need to publish in English; however, published manuscripts may reflect a need for language editing. The study is aimed to investigate the language accuracy of Persian authors' articles published in Iranian health journals, and to explore whether these journals take steps towards an acceptable level of Standard written English.

MATERIALS AND METHODS: In this descriptive study, fifty original articles were selected from five health journals (from April 2017 to April 2018) with nonnative editors/proofreaders based on convenience sampling in 2019. The articles were carefully read several times; errors were identified according to Gass and Selinker's model and classified into four categories and further expanded into 22 subcategories.

RESULTS: The results showed 4322 errors in the 50 articles, where the "grammatical errors" obtained the highest frequency, with punctuation errors ($n = 989$) ranking first, and errors in using auxiliary verbs ($n = 19$) the last in frequency. The descending order of the errors emerged as follows: the grammatical, mechanical, lexical, and discoursal errors.

CONCLUSION: All categories of errors contributed to textual unintelligibility, attributable to either the authors' inadequate English proficiency or their native language interference. Most errors could have been corrected by the journal editors. Professional development courses and hands-on workshops are advised for both nonnative authors and journal editors/proofreaders in Iran to help authors keep to the conventions of scientific writing.

Keywords:

Academic English, health journals, language errors, manuscripts, scientific writing

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Introduction

The health-care researchers develop passionate in sharing their research findings with peers to help expand the borders of knowledge through published papers. Benson believes that "publishing is a way for members of the academic community to share ideas and possibly contribute something to the world's store of knowledge; to publish is to engage in a dialogue with unseen and often unknown others."[1] Similarly, health-care researchers in Iran are required to carry out research in

areas such as public health, environmental health and industrial hygiene, and publish in reputable journals which are indexed and abstracted in internationally credited databases.

For the information of readers, and to keep consistency, we would like to use the term "errors" rather than "mistakes" throughout the present paper since, as Brown contends, the former "reflect(s) the competence of the learner" while the latter indicates "a failure to utilize a known system correctly."[2] Theoretically, part of the errors found in manuscripts may be attributable to the imperfect learning or the transfer of

first language patterns onto the second language of communication.[3]

There has been a plethora of research on error analysis in scientific writing, investigating the errors in journals of health and medical sciences.[4-9] Habibzadeh claims that "the ambiguity in the manuscript comes from poor usage of terms or awkward grammar and syntax;" he further contends that some authors should "ask a native speaker familiar with scientific writing (preferably, one of their colleagues) for advice on language usage because even (native English-speaking) editors need an editor."[4]

Coates *et al.*, surveyed language errors in manuscripts and divided the language errors of each section of a manuscript into three principal groups: grammatical, structural, and lexical errors.[10] Pierson listed ten reasons why manuscripts are not accepted for publication.[11] Rivera reviewed twenty common grammatical errors and suggested strategies to correct them. He believes some errors can persist due to incomplete knowledge of grammatical norms, punctuation, and vocabulary on the part of the authors.[12] Johnson and Green reviewed common errors that authors may make and discussed the errors. They held that the errors are due to the fact that the manuscript was not proofread by someone fluent in the English language and that the grammar or spelling errors were not corrected before submission.[13] Providing advice for authors, Moos had already stated that authors should develop basic writing skills such as sentence structure, grammar, and writing concisely because violating these basics appears as barriers in the revision process and leads to the frustration of manuscript editors.[14]

Tending toward solutions, 12 types of errors in the scientific papers written by nonnative speakers of English were considered by Marina and Snuviškiene.[15] Similarly, Burgess listed the most common grammatical and scientific errors he had encountered during his 25 years of reviewing over 1000 manuscripts.[16] Gholami and Zeinolabedini surveyed the most-occurring language-related errors the Iranian medical authors/researchers committed and claimed that the editors had surprisingly dealt with discoursal errors, lexical replacements, grammatical improvements, and the mechanics of academic writing in order.[9] Chawala and Georrge considered the academic writing as numerous considerations and believed that the writers should gain expertise in the skills and areas such as choosing a title, grammar and common errors, abbreviations, redundancy, misused terms, ambiguous words, and reference citation.[8]

Onwuegbuzie analyzed formal grammatical errors committed in 117 manuscripts submitted to the journal of Research in the Schools over a 6-year period, and further identified a link between the number of grammatical errors and the subsequent disposition of a manuscript.[7] Salehi and Bahrami pinpointed the most common errors in 40 articles written by Iranian student authors and listed eight types of errors. They found that errors in word usage and subject-verb agreement were of the highest and lowest frequencies, respectively.[5] Zeinolabedini and Gholami studied the consulting comments Iranian author-researchers in the field of medical sciences received from English teacher editors. They stated that the most problematic areas in Iranian author-researchers' manuscripts were related to dangling structures, use of conjunctions, correct tense of the verbs, use of prepositions, reducing the adjective clauses, and use of adjectives.[6]

To the best of our knowledge, no study to date has been carried out to investigate the language accuracy of published health-care articles of Persian authors in Iranian health journals. What distinguishes the present study from other contexts is that both researcher and reviewers are both nonnative English speakers, but write and review articles which are written and submitted in English. Thus, the present article specifically aims to investigate the language accuracy in the articles written by Persian authors and published in Iranian health journals, and to explore whether these journals stick to an acceptable level of language accuracy and standard English or not.

Materials and Methods

To pinpoint the errors, in this descriptive study, a total of 50 original articles published in five journals (ten articles from each journal) were selected by convenience sampling method. The journals were related to health areas specifically in public health, industrial hygiene and environmental health and air pollution. The articles were selected from the latest issues of the journals (April 2017 to April 2018), and were mainly written by Persian researchers with different academic ranks (i.e., instructors, assistant professors, associate professors, and full professors). All sections of the articles were examined for error analysis except for the References and Appendices sections.

Procedure

To explore the errors, the first and third authors read all the selected articles carefully and identified the errors. The findings were checked and cross-checked in meetings to reach agreement on the types and instances of errors. Then, they classified the extracted errors and recorded their frequency in four major categories: grammatical errors, mechanical errors, lexical errors, and discoursal

errors; these were further divided into 22 subcategories. Presented in Tables 1-6, instances of each error were explored and recorded for each subcategory together with the corrected suggestions.

Data analysis

Earlier studies have proposed models with almost similar steps for conducting error analysis.[17,18] In the present study, the procedure of analyzing the errors was adopted from Gass and Selinker's model, who suggested the following six steps: "collecting data, identifying errors, classifying errors, quantifying errors, analyzing sources of error, and remediating for errors" (p. 67).[19] The collected data were analyzed, in Excel, using descriptive statistics (e.g. frequency and percentage) for each of the errors categories, in general, and for each single journal, in particular.

Ethical considerations

The study gained ethical approval from the deputy for research at Gonabad university of medical sciences (The ethics approval code: IR.GMU.REC.1397.121). Further, to keep the journals and the authors' names confidential and anonymous, the five selected journals were coded as A, B, C, D, and E. Furthermore, the ten articles from each journal were coded as 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10; the resulting codes for the articles then appeared as A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, etc.

Results

Based on a rigorous procedure and triangulated analysis of the errors, a corpus of 22 error types was primarily explored and classified. First, the most and least frequent error types appeared to be the errors of "punctuation" and "auxiliary verbs" misuse, respectively, in the following table.

Then, to present a vivid classification of the errors, they were grouped under four major categories (i.e. grammatical, lexical, mechanical, and discoursal errors) and relevant subcategories based on Gholami and Zeinolabedini's error classification.[9] As shown in the table below, the grammatical, mechanical, lexical, and discoursal errors are presented in descending order, based on frequency and percentage.

For anonymity purposes, we used letters (A, B, C, D and E), rather than their names, to report the frequency of errors in each journal. Notably, the frequency of errors in journal A (n = 1078) was the highest, but journal E (n = 680) was the lowest.

Finally, the subcategories were clustered onto four major headings: grammatical, mechanical, lexical, and

Table 1: The frequency and percentage of errors in descending order

Rank	Type of error	Frequency (%)
1	Punctuation	989 (22.88)
2	Spacing	453 (10.48)
3	Articles	410 (9.49)
4	Wrong word	376 (8.5)
5	Pluralization	363 (8.40)
6	Capitalization	187 (4.32)
7	Subject-verb agreement	191 (4.42)
8	Ambiguous sentences	159 (3.68)
9	Transitional words/phrases	154 (3.57)
10	Prepositions	142 (3.29)
11	Verb tenses	120 (2.78)
12	Conjunctions	117 (2.71)
13	Active/passive voice	115 (2.66)
14	Persian structure	107 (2.48)
15	Possessives	102 (2.36)
16	Sentence fragments	65 (1.50)
17	Idioms	61 (1.42)
18	Relative pronouns	60 (1.39)
19	Run-on sentences	49 (1.13)
20	Spelling	46 (1.06)
21	Word order	37 (0.86)
22	Auxiliary verbs	19 (0.44)
Total		4322 (100)

Table 2: Categorization of errors in descending order

Major category	Error subcategory	Frequency (%)
Grammatical errors	Articles	410 (9.49)
	Pluralization	363 (8.40)
	Subject-verb agreement	191 (4.42)
	Prepositions	142 (3.29)
	Verb Tense	120 (2.78)
	Conjunctions	117 (2.71)
	Active/passive voice	115 (2.66)
	Possessives	102 (2.36)
	Relative pronouns	60 (1.39)
	Word order	37 (0.86)
	Auxiliary verbs	19 (0.44)
n	11	1676 (38.75)
Mechanical errors	Punctuation	989 (22.88)
	Spacing	453 (10.48)
	Capitalization	187 (4.32)
	Spelling	46 (1.06)
n	4	1675 (38.74)
Lexical errors	Wrong word	376 (8.5)
	Transitional Words/phrases	154 (3.57)
	Idioms	61 (1.42)
n	3	591 (13.67)
Discoursal errors	Ambiguous sentence	159 (3.68)
	Persian structure	107 (2.48)
	Sentence fragment	65 (1.50)
	Run-on sentence	49 (1.13)
n	4	380 (8.79)
Total	22	4322 (100)

discoursal. In what follows, the major categories and their subcategories are presented.

Table 3: Examples of subcategories of grammatical errors and their corrected forms

Subcategories of grammatical errors	Error identification	Error correction
Articles	B4 The aim of … to evaluate **relationship** between ….	The … evaluate **the relationship** ….
Pluralization	B5 The IARC … into **five group** to show …,	The … **five groups** …,
Subject-verb agreement	E1 Most **recurrences** (50%-60%) **occurs** within ….	Most … **occur** ….
Prepositions	C8 **Despite of** extensive researches into …	Despite extensive….
Verb Tense	A5 Pseudocyst form of *T. muris* **are** more frequent … and … *T. muris* **was found** ….	Pseudocyst … **was** more frequent ….
Conjunctions	B8 It is estimated … fuels (coal, oil **and etc.**) for producing energy in ….	It is estimated … fuels (coal, oil, **etc.**) for producing energy in ….
Active/passive voice	D1 This … study **conducted** with 114 … workers.	This … **was conducted** ….
Possessives	A8 Thus **remove of them or its precursors** are essential to avoid impact on ….	Thus, **removing them or their precursors** ….
Relative pronouns	A1 The effect of Na4EDTA **ranged** from 25 to 75 mg/L on extraction efficiency was evaluated.	The … Na4EDTA **which ranged** ….
Word order	D2 **This form proposed to** will be used in a ….	**This proposed form** will be used in a ….
Auxiliary verbs	B5 As mentioned …, and **there a good** correlation between ….	As …, **and there was a good ….**

Table 4: Examples of subcategories of mechanical errors and their corrected forms

Subcategories of mechanical errors	Error identification	Error correction
Punctuation	D6 The question of noise pollution in this **district,** has been neglected ….	The question of noise pollution in this **district** has been neglected ….
Spacing	D5 Variables such **asage,** hours of exercise per ….	Variables … **as age,** ….
Capitalization	E7 In **turkey** as 18-20 cases per 100000 ….	In **Turkey** ….
Spelling	C5 **Sligh** injury (**stoppong** of operation ….	**Slight** … (**stopping** of …

Table 5: Examples of subcategories of lexical errors and their corrected forms

Subcategories of lexical errors	Error identification	Error correction
Wrong word	B7 **driven form**	**Derived from/drawn from**
Transitional words/phrases	E4 **Another hand**, A4 **In another hand**, B9 **On one hand**	**On the other hand**
Idioms	B7 **regarding to/in regards to**/D1 and E2 **with regards to**/B6 and E1 **regards to**, D10 **in this regards**	**regarding, with/in regard to**

Grammatical errors
Articles
An "article" is any of a small set of words or affixes (such as *a, an*, and *the*) which are used with nouns to limit or give definiteness to the application or to indicate the type of reference being made by the noun. English has two types of articles: definite (i.e. *the*), and indefinite (i.e. *a* and *an*).

Pluralization
Clarifying the number of entities in science is of paramount importance. Sometimes, in the pluralization of nouns (i.e., their being either singular or plural), the authors make a mistake for one reason or the other.

Subject-verb agreement
The subject and verb of a sentence must agree in number. Therefore, if a subject (the person/thing which does the action) is singular, its verb (the word indicating the action) must be singular too, and vice versa.

Prepositions
Errors in using prepositions occur when authors add, omit, or misuse a preposition such as *for, into, to, on, by*, etc., These are usually used in front of noun phrases or pronouns to show the relationship between the noun or pronoun and other words in a sentence.

Verb tense
Verb tense errors occur when the authors use the wrong tense of a verb regarding the rest of the sentence or the sentences preceding or following the sentence, in which the verb is used. Being consistent in using the right tense (i.e. present, past, or future) within the same clause/sentence is expected.

Conjunctions
A conjunction is a word such as "*and*", "*but*", "*or*", "*while*" or "*although*" that connects words, phrases and clauses in a sentence. They sometimes help to make a compound

Table 6: Examples of subcategories of discoursal errors and their corrected forms

Subcategories of discoursal errors	Error identification	Error correction
Ambiguous sentence	E6 Physical activity of participants was assessed by validated Persian, last 7-day long form of IPAQ	The physical activity of participants during the last 7 days was assessed through a form of IPAQ which had already been validated in Persian
Persian Structure	B7 **Although**, it is suggested that all the pathogens are susceptible to UV, **but** the susceptibility is different	**Although** …, the susceptibility ….(**but** is extra)
Sentence Fragment	B5 The levels of trace metals observed in the current research with those reported in various locations around the world	The levels of trace metals observed in the current research were compared with those reported in various locations around the world
Run-on Sentence	D3 However, the prevalence of lumbar disk hernia was higher in men in comparison to women and as the higher educational level, the lower prevalence of disk hernia.	………. was higher in men in comparison to women. **Also**, as the higher **the** educational level **was**, the lower the prevalence of disk hernia **was**

IPAQ=International Physical Activity Questionnaire

sentence, too. Failing to use the right conjunction word or sentence connectors makes the sentence hard to comprehend.

Active/passive voice

Errors in active or passive voice occur whenever authors erroneously focus either on the action or the agent of an action; in a passive sentence, the person or thing acted on appears first, and the actor usually comes at the end which is introduced with the preposition "*by*".

Possessives

The possessive form is used to shows a relationship of belonging between one thing and another. To form the possessive, an ("*s* or *s'*") can be added to an animate noun. If the noun is inanimate, the "*of*" structure is preferred.

Relative pronouns

A relative pronoun (e.g., *which*, *who*, *whom*, *that*, *whose*, *where*, *when, or* why) is used to begin a relative clause, which is usually used to describe a noun or pronoun to give additional or definitive meaning to it.

Word order

The arrangement of words in a phrase, clause, or sentence plays an important part in determining the intended meaning and makes the sentence comprehensible to the reader. Wrong word order will usually result in misunderstanding.

Auxiliary verbs

Auxiliary verbs include *am, is, are, was* and *were, being, been,* and *be, have, has, had, do, does, did*; the modal auxiliaries are *will, would, shall, should, may, might, must, can, could, ought to, have to, has to, had to*, etc., Sometimes, they disappear from sentences. Examples of the above-mentioned subcategories of grammatical errors and their corrected forms are presented in Table 3 (The errors and the corrected forms are written in bold type.).

Mechanical errors
Punctuation
Punctuation refers to the marks such as a *full stop, a comma*, and *brackets or parentheses*, which are used in writing to separate sentences/clauses and their elements. Punctuation also involves the use of spacing, conventional signs, and certain typographical devices as aids to understanding and clarifying the meaning.

Spacing
In writing, a space is a blank area that separates words, sentences and other written or printed characters. Furthermore, it is related to the mechanics of writing, which should be closely observed by typists. Ignorance of spacing may often denote a lack of precision.

Capitalization
Capitalization is writing a word with its first letter in capital or uppercase letter, and the remaining letters in lower-case. Abbreviations, proper nouns, trade names, and titles of works are generally capitalized. It is related to the mechanics of writing; however, it sometimes changes the meaning of a word completely (e.g., "*Turkey*" and "*turkey*" signify quite different entities).

Spelling
Spelling is the combination of alphabetic letters to form a meaningful written word. It indicates the formation of words with the correct letters in the correct order, the ability to do this, or the way a particular word is spelled. The table four below displays examples of the above-mentioned subcategories of mechanical errors and their corrected forms (The errors and the corrected forms are written in bold type.).

Lexical errors
Wrong word
Use of the right word or technical term was a frequent error where the authors had failed to communicate effectively and accurately. Areas such as using a word with the wrong meaning, jargon, noun misuse,

or the wrong preposition led to the formation of this category.

Transitional words/phrases

The coherence of ideas in a text (i.e., a sentence, a paragraph or a passage) can be achieved via using the transitional word or phrases (i.e., cohesive devices), which show the relationship in time, space, comparison, contradiction or contrast, illustration or qualification, cause and effect, addition, concession, summary or conclusion, and repetition or intensification.

Idioms

An idiom is a set of words in a fixed order, showing a particular meaning different from the meanings of each word standing alone and understood in isolation. In other words, these fixed expressions are used for expressing the usage of a concept that is quite conspicuous by itself, either grammatically or with a peculiar meaning that cannot be derived from the meanings of its elements in separation. Table 5 which exhibit examples of the above-mentioned subcategories of lexical errors and their corrected forms which are written in bold type.

Discoursal errors

Ambiguous sentences

Ambiguity occurs when the meaning of a word, phrase, or sentence becomes uncertain, and consequently more than one interpretation becomes conceivable. Ambiguous sentences appear too long and contain many independent clauses; they contain coordinating conjunctions (i.e., and *but, for, or, nor, so,* and *yet*), or words that connect independent thoughts to one another.

The Persian sentence structure

This type of error transfers from an author's mother tongue (native language), and refers to those errors that are traceable to the interference from one's first language, i.e., negative interlingual transfer.

Sentence fragments

Sentence fragments are unfinished sentences which don't contain a complete idea. A common fragment sentence is a dependent clause standing alone without an independent clause. In simple terms, a sentence fragment is a group of words which is only part of a sentence and does not express a complete thought or meaning, for example, because they lack either a subject or a verb.

Run-on sentences

These are grammatically unacceptable sentences in which two or more independent clauses are joined without a word to connect them, or a punctuation mark to separate them; such faulty clauses/sentences can be easily fixed via inserting a coordinating or connector, a period, or a semi-colon. Table 6 presents examples of the above-mentioned subcategories of discoursal

errors and their corrected forms which are written in bold type.

Discussion

The study investigated the language accuracy in the articles written by Persian authors and published in Iranian health journals and explored if the journals stick to an acceptable level of language accuracy and Standard English. Fifty original articles were investigated and twenty-two error subcategories were listed.

Considering the major and minor error categories (22 categories altogether), the results are in line with those of Salehi and Bahrami with eight error types,[5] Onwuegbuzie with 35 categories,[7] Rivera with 20 categories,[12] Coates *et al*., with 35 groups,[10] Currie and colleagues with 15 error subcategories,[20] Marina and Snuviškiene with 12 types,[15] Pierson with eight error types,[11] and Coates *et al*., with three major and six minor classes of errors.[10] Although error classification differs in style from study to study, almost all of them emphasize the accuracy of scientific writing and refer to a wide scope of errors manuscript authors commit in academic writing. Authors of the present study believe that the list of errors may not appear as all-inclusive too, and further investigations may render a different classification in future.

Regarding the grammatical errors and the respective subcategories, our findings correspond to those of Weaver who stated that special attention should be paid to the features of grammar (articles, singular and plural, subject-verb agreement, preposition, verb tense, conjunctions, active and passive sentences, possessives, relative pronouns, word order, and auxiliary verbs) which are of value in assisting writers to eliminate errors;[21] also, they are in line with Moos' findings who suggested that focusing on basic writing skills such as grammar, syntax, and sentence structure (verb tense, active/passive voices, and plurality) is of high value.[14] In the same vein, Onwuegbuzie emphasized "the importance of paying attention to grammar (use of verb, indefinite article, use of tense, use of preposition, possessives, conjunctions, split infinitive, and subject-verb disagreement) when preparing manuscripts" and contended that the authors learning how to write with discipline should primarily focus on the most common formal grammatical errors and try to avoid them.[7] However, a similar study in Iran has ranked grammatical errors (for example, tenses, usage of articles and prepositions, and agreement between verbs and nouns) in the third most frequent place; a finding which contradicts our results where grammatical errors occupy the first place.[9] The difference may originate in the type of authors and journals, where papers were written by medical researchers; also, they

included non-Iranian journals where journal editors and reviewers were native English editors;[9] while in our study, the papers of health researchers published in Iranian journals were reviewed, where both authors and editors/proofreaders are non-native English users (i. e., the Iranian authors).

As regards the mechanical errors (such as "turkey" instead of "Turkey," "sligh" instead of "slight," and "monor" instead of "minor"), the findings of the present study are in agreement with those of Burgess who emphasized the use of punctuation and spell-checker software to avoid such errors (for example, "stoppong" instead of "stopping" or "co-workers" for "co-workers") in manuscripts.[16] However, Coates *et al*. and APA authors stated that using a computer spell-checker or word-processing programs may not be as efficient as a proofreader; the work should be checked or even double-checked by either native colleagues or professional, scientific writers because, in some cases, even a word which is correctly spelled may be appropriate in a contrastingly different setting and sense. A spell-checker or word processing program will solely lessen the incidence of typographical errors or misspellings.[10,22] Nevertheless, proper nouns, compound words and homonyms (such as "turkey" for "Turkey") can evade the spell-checkers. At times, manuscripts loaded with lots of spelling and grammar errors will most probably stimulate the chance of rejection by editors and peer reviewers.[13] Mechanical errors, namely, hyphenating, case lettering, spacing, spelling, and spacing with commas accounted for about one-tenth of errors in Gholami and Zeinolabidini's study,[9] which is in contrast with our findings indicating one-third.

As for the lexical errors such as "driven from" for "derived from" or "drawn from," "another hand," "in another hand" or "on one hand" instead of "on the other hand," the findings are consistent with those of Salehi and Bahrami, Rivera, and Onwuegbuzie and Scarfe who pinpointed these error types, attributed utmost importance to them, and put special emphasis on the accuracy of the word usage (to name a few examples are the use of "same as" for "the same as," "As the result," for "As a result;" "despite of" for "despite;" and "in order/in order for" for "in order to").[5-23] Furthermore, Habibzadeh believed that statements in a manuscripts may become ambiguous because of poor usage of terms.[4] In Gholami and Zeinolabedini's study,[9] lexical revisions ranked second and accounted for nearly one-fifth of the occurrences; while in our study, they were ranked in the third place.

With regard to the discoursal errors, Chawala and Georrge believed that scientific texts have to be void of ambiguity and vagueness; in other words, ambiguous, fragmented and run-on sentences must be avoided all throughout the written discourse (An example is this fragment sentence: "The levels of trace metals observed in the current research with those reported in various locations around the world.").[8] Further, some of these errors originated in negative interlingual interference, as Salehi and Bahrami contended; they referred to mother tongue interference as a leading factor in committing errors by Iranian novice researchers publishing articles, a phenomenon we also observed in the articles we analyzed, i.e., the trace of the Persian language in the wordings of manuscripts written by Persian authors (A few common errors are observed in these examples: "**Although** the sample was diverse…, **but** the results." or Its validity was approved of by **scientific staff members** of … University of Medical Sciences.).[5] Notably, in this study, the discoursal errors gained a low frequency which is in contrast with the findings of Gholami and Zeinolabedini who reported a much higher frequency of discoursal errors.[9]

To sum up, we would like to quote Scarfe contending that "brevity and clarity are the hallmarks of accurate and precise scientific writing; a working knowledge of grammar, punctuation, spelling, and word usage are essential to tighten text and create written precision."[23] As the last line of our study, intensive instructional programs are suggested for both authors and editors in health fields. The pinpointed error types may be intensively presented in workshops and training courses. Despite the time pressure and limitations journals encounter in the process of article publication,[22] gravity of errors should be reminded to both authors and editors. Needless to say, the role of a language expert proficient both in English and in health sciences should not be neglected in collaboratively checking the final draft of a manuscript.[24,25] And finally, as Lipworth *et al*. suggest a "dialectical" model where all dimensions of the manuscript review process are to be taken into account, the editors guaranteeing the quality of the manuscripts in their journals should be strict enough regarding the language errors of manuscripts in returning them to authors for revision and correction.[26]

In a nutshell, the role of English as an international language is highlighted for scientific cooperation and dissemination of knowledge[27] as well as a prerequisite course in most academic and special majors.[28] For novice learners and researchers, it is recommended to provide them with free, open-access advice,[29] and help them avoid research publication pitfalls and challenges at hand.[30]

Conclusion

All in all, twenty-two types of errors were explored, some originating in the authors' defective English knowledge and some due to the effect of their mother tongue

(i.e., Persian), all of which could be either improved by the proper instruction of academic writing or corrected by journal proofreaders.

In this study, the articles we investigated were found to be less successful in sticking to the conventions of scientific writing. Furthermore, strategies such as peer correction, reading a paper aloud in an empty room, using online and offline writing guidelines, and consulting a good dictionary, prior to submission, are great solutions for novice writers.[14] Moreover, using a spell-checker or word processing program should not be totally abandoned. Last but not least, getting help from a language editor/proofreader with near-native proficiency in English and academic writing can be of paramount importance in producing well-drafted and error-free manuscripts.

Finally, the authors wish to highlight some of the limitations of the study, the first being the sample which included only the written product of Persian authors in Iranian journals. The second limitation was confining the scope of the investigation into "health" journals. A final limitation is our failing to examine the error types in the References and the Appendices of the articles.

Conflicts of interest
There are no conflicts of interest.

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