# The role of discussion sections in research articles: the case of health information-seeking studies

*Reijo Savolainen*

## Abstract

**Introduction.** Drawing on the ideas of genre analysis, this article elaborates the role of discussion sections as sites where researchers reflect their contributions to a particular field of study.

**Method.** A sample of 100 discussions sections of research articles examining health information seeking was scrutinized by means of descriptive quantitative analysis. To obtain a quantitative overview, the percentage distribution of the codes assigned to the 14 constituents of discussion sections was calculated. The main emphasis was laid on qualitative content analysis.

**Analysis.** The qualitative analysis focused on the content of diverse constituents of discussion sections, for example, interpreting individual research results and reflecting the theoretical contributions of the study. More specifically, the analysis focused on the variation in the constituents´ content. To achieve this, similarities and differences were identified in the ways in which the authors depicted such content per constituent, for example, while summarizing the key findings and reflecting the empirical contribution.

**Results.** The findings indicate that in discussion sections of research articles on health information-seeking studies, researchers direct their main attention to the interpretation of individual (key) findings. While reflecting their contributions to health-information studies, they also compare their findings in order to identify similarities and differences with prior studies. Moreover, they are active to propose topics for future research. In contrast, researchers in the above domain quite seldom employ analytically demanding strategies by explaining the similarities and differences or reflect the theoretical and methodological implications of their study.

**Conclusion.** Researchers prefer a conservative approach by seeking confirmatory support for their findings, rather than challenging them by presenting contrasting evidence.

## Introduction

The discussion section occupies a central role in research articles because ideally such sections crystallize how the paper at hand has contributed to a research field. Annesley (2010, p. 1671) elucidates the significance of the discussion section by characterizing the reading habits of scientists. When reading a paper, they first tend to look at the abstract to get an overview of the topic and the purported findings. If the topic appears to be of interest, they move to the discussion section. If it is neither stimulating nor convincing about the meaning and importance of the findings, it does not really matter how the experiments were performed or what results were reported in the findings section.

So far, the features of discussion sections have mainly been analysed in language studies. Many of these investigations draw on *genre analysis*, with the intent to specify the schematic structures of discussion sections. As a result, diverse structural constituents referred to as *moves* and *steps* have been identified. Moves are linguistic and rhetorical constructs, and they include, for example, the comparison of findings with the observations of prior investigations and the specification of the theoretical contributions of the study. Steps are subconstituents of moves; examples of steps include the explanation of a surprising finding and the evaluation of the significance of an observation (Al-Shujairi *et al.*, 2019). Since the 1980s, genre studies have offered a detailed picture of the structural features of discussion sections in diverse fields such as Applied Language Science, Computer Research, Psychology and Sociology. On the other hand, the studies scrutinizing moves and steps are limited in that the findings offer only a surface picture of the content of discussion sections. The results just provide illustrative examples of how the content of research findings appears within structural constituents.

The present investigation pioneers in the domain of information behaviour research by examining the role of discussion sections in a health information seeking studies. The findings deepen our understanding about how researchers examining the issues of health information seeking crystallize their contributions and reflect their significance. This domain was chosen for the study because it represents an established subdomain of information behaviour research (Given, Case and Willson, 2023, pp. 81-85). In general, health information seeking deals with the ways in which people identify, select and access information about their health, health promotion activities, risks to one's health, and illness (Lambert and Loiselle, 2007; Mirzaei *et al.*, 2021). Given the broad repertoire of the topics of health information seeking, it may be expected that the discussion sections of research articles offer a fertile ground for the analysis of the ways in which scholars reflect their contributions to this particular domain. The present investigation draws on the frameworks of genre-based studies referred above. However, different from them, the focus is placed on the constituents´ content in discussion sections. The findings are also relevant from the perspective of scholarly communication because the writing of research articles offers a major way to publish the results of scientific work.

The rest of the article is organized as follows. The literature review characterises further the nature of discussion sections and depicts the genre analytic approach to the topic. Thereafter, the research framework of the present investigation is specified, followed by the formulation of the research questions and the description of the empirical data and its analysis. Next, the research findings are reported, and their significance is reflected.

## Literature review

### The nature and role of discussions sections in research articles

Academic articles published in diverse fields are commonly divided into four parts: Introduction, Materials and Methods, Results and Discussion, denoted as IMRaD or IMRD (Qin and Zhang, 2023, pp. 885-886). The IMRaD structure has become popular because it intuitively reflects the process of scientific discovery. As early as the 1970s, the American National Standard Institute (ANSI) and

the International Committee of Medical Journal Editors (ICMJE) used the IMRaD structure as a standard, and it became the written format for most journals (Qin and Zhang, 2023, p. 886). The IMRaD structure not only ensures the effective communication of scientific discoveries; it also can help readers to locate specific information efficiently without browsing the entire paper.

To examine the contributions offered by scholarly articles, researchers have analysed their diverse constituents such as abstracts (Capkin, 2024), introductory sections (Swales, 1981), results sections (Brett, 1994) and discussion sections (Al-Shujairi, 2021). The functions of the constituents can be put in a broader context by characterizing the practices and conventions of scholarly writing. Hyland (2008, p. 3) suggests that writers draw on the *'persuasive practices of their discipline, encoding ideas, employing warrants, and framing arguments in ways that their potential audience will find most convincing'*. To this end, researchers writing discussion sections make attempts to specify how their results integrate with and contribute to disciplinary knowledge (Swales, 1990, p. 173). Usually, this is done by referring to the findings of prior studies in order to confirm their interpretation or explanation about an issue (Arsyad *et al.* 2020, p. 294). References to prior research are also made to contrast one´s findings with previous relevant studies.

The writing of effective discussion sections tends to be one of the most demanding tasks for novice researchers in particular (Angelini, 2023). While other sections of a research paper require orderly and logical writing, the composing of discussion section requires reflection and critical appraisal, as well as the synthesis and interpretation of the findings (Ghasemi *et al.*, 2019). On the other hand, the discussion section can be the most interesting part for readers to consume because a well-written Discussion provides insights not found elsewhere in the paper (Conn, 2017). Masic (2018, p. 306) emphasizes the significance of the discussion section by characterizing it as *'the heart of every scientific article'*. In an ideal case, the discussion section indicates clearly, what the study has added to the current knowledge and how it has enhanced understanding of the subject (Bavdekar, 2015, p. 41). In this regard, the final text paragraph of Discussion is particularly important because it offers an opportunity to crystallize the *'take-home message'* of the study (Goulston, 2023).

The writing of the discussion section is also demanding in that the writers have to find an appropriate balance between the factual and speculative elements while reflecting their contributions. Ghasemi *et al.* (2019) recommend that researchers should go beyond the data while interpreting the findings, but not too far. They should provide insights; a task that is more than a mere comparison of the results with prior research. Skelton and Edwards (2000, pp. 1269-1270) take a more liberal view by suggesting that some speculative language in the discussion section is desirable. This is because researchers should not simply repeat their results already depicted in the findings section. The function of the Discussion is to discuss; it should therefore be discursive in nature. Even though there are no generally agreed guidelines in this regard, researchers have identified features characteristic of effective discussion sections. Kearney (2017, p. 290) likens them to a *'road map'*. Readers are '*grateful when authors clearly and concisely depict how the results do or do not move the science forward*'. Readers' confidence grows when the discussion provides a road map of where they are after this study, in comparison to where they were before (Kearney, 2017, p. 290).

The content of discussion sections has also been evaluated critically. Avidan, Ioannidis and Mashour (2019, p. 414) have drawn attention to the problematic features of discussion sections in medical journal articles. One of the weaknesses is a tendency to preferentially cite studies offering findings congruent with authors' perspectives. Critique has also been addressed towards the fusion of the discussion and conclusion sections. Lamanauskas (2021, pp. 7-8) emphasizes that researchers should avoid sections titled as "Discussion and Conclusions" or "Discussion with Conclusion" in order not to create a blend containing all in one. This is because concluding sections serve a different end, that is, *'the purification of the gist of the research carried out'* (Lamanauskas, 2021, pp. 7-8). Essentially, as Gray (2019) reminds us, the conclusion is the final opportunity for the

authors to emphasize to the reader what the most important message of their study was, and impress upon them a particular recommendation, idea, or assertion.

## Genre-based research approaches to the discussion sections

Since the 1980s, there have been a number of genre-based investigations examining the structure of the discussion sections in diverse fields such as Medicine (Smith, 1984), Political Science, Sociology, and History (Holmes, 1997), Applied Linguistics (Yang and Allison, 2003), Education (Lim, 2010), and Dentistry (Basturkmen, 2012). In general, a *genre* comprises '*a class of communicative events, the members of which share some set of communicative purposes*' (Swales, 1990, p. 58). These purposes are recognized by the expert members of the parent discourse community and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style. Many of the genre studies resemble each other in that they are based in the identification of *moves* as constituents of discussion sections. Moves are the building blocks of generic structures and can be used for the purpose of identifying the rhetorical and functional patterns in texts (Swales, 2004). Examples of moves include the comparison of findings with the observations of previous research and the recommendation for further research. Moves can incorporate subconstituents referred to as *steps* which denote the options writers select from to accomplish the moves (Swales, 1990). For example, if an individual Move is referred to as comparing findings with literature, constitutive steps of this move can be indicating consistency of findings with literature, and indicating inconsistency of findings with literature (Dobakhti, 2016, p. 1385).

The first framework depicting moves as constituents of discussion sections was developed by Diane Smith (1984). She proposed a four-move model based on a corpus constructed from British Medical Journal. The framework consisted of four moves: Explain method, Interpret results, Refer to literature, and Implication. Influential early studies also include Peacock′s (2002) investigation on moves in discussion sections across seven disciplines. Based on his empirical findings, Peacock (2002, p. 493) developed a model comprising eight moves:

1. Information (background about theory/research aims/methodology)

2. Finding (with or without a reference to a graph or table)

3. Expected or unexpected outcome (comment on whether the result is expected or not)

4. Reference to previous research

5. Explanation (reasons for expected or unexpected results)

6. Claim (contribution to research, sometimes with recommendations for action)

7. Limitation

8. Recommendation (suggestions for future research).

Later investigations have further refined the picture of the structure of discussion section. Drawing on Peacock′s (2002) model reviewed above, Al-Shujairi et al. (2019) compared the rhetorical moves and the linguistics realisations in the discussion sections in Medical Sciences and Applied Linguistics. Different from Peacock′s (2002) model, their study was not restricted to the analysis of moves because some moves may be realised by several steps, each of which has its communicative function that contributes to the communicative purpose of a move as a whole. Based on the empirical findings, Al-Shujairi et al. (2019, p. 36) proposed a new model of moves and steps constitutive of discussion sections. The model is particularly relevant for the present investigation because it analytically integrates the major constituents identified in earlier investigations on the topic. The model includes altogether nine moves and eight steps as follows:

Move 1. Background information

        Step 1. Restating objectives

        Step 2. Representing research design

        Step 3. Defining a construct

Move 2. Findings

Move 3. Expected or unexpected outcome

Move 4. Reference to previous research

Move 5. Explanation

        Step 1. Reasoning

        Step 2. Exemplification

        Step 3. Elaboration

Move 6. Claim

Move 7. Concluding information

        Step 1. Limitation

        Step 2. Recommendation

Move 8. Implication

Move 9. Summary of results

The model suggests that some of the functions of the discussion section, for example the claim, can be specified at the level of single moves. The move of the claim incorporates the writers´ arguments about the generality of some or all of the reported results, which is inferred or concluded from the line of argumentation in the previous part of the text. Three of the moves are more complex and they require the specification of constitutive steps. For example, the move explanation is realized by three steps, that is, reasoning, exemplification, and elaboration (Al-Shujairi *et al.*, 2019, pp. 33-34). While explaining their results, the authors give reasons for their findings, offer examples from their data or elaborate further the meaning of a finding.

More recently, Al-Shujairi (2021) offered a useful review of studies examining the discussion sections of research articles since the 1980s. The review showed that differences in writing the discussion section varied across soft sciences (e.g., applied linguistics and sociology) and hard sciences (e.g., biology and chemistry). Although diverse models share some similarities in the purpose of the moves (e.g., explaining the results and referring to literature), several aspects from the moves would distinguish a framework from another. For example, while the move limitation was found in some models (e.g., Peacock, 2002), it was absent in others (e.g., Holmes, 1997; Swales, 1990). This difference could be caused by the variations of communicative purpose across disciplines. The above observations support the conclusion drawn from Liu and Buckingham (2018, p. 99). They noted that the attempts to identify diverse features of moves, for example, move frequency, opening and closing moves, and move sequences have brought mixed results. On the other hand, genre studies have not only identified the variation of the structural constituents of discussion sections. Hashemi and Moghaddam (2019, p. 243) demonstrated that these investigations have also identified well-established academic conventions and norms to which

authors of discussion sections conform in order to create academic uniformity and discourse identity.

## Research framework

The literary review suggests that discussion sections form a significant part of research articles because these sections crystallize the key findings of the study, explain their significance, reflect the study´s contribution to a research domain, and identify the limitations of the investigation. The literature review also indicated that genre-based studies have concentrated on the structural constituents (moves and steps) of discussion sections, particularly the order in which they appear in the texts. While the present study draws on the above findings while identifying the relevant constituents of discussion sections, it also introduces a new viewpoint by concentrating on how researchers fill the *containers* labelled as constituents with particular content pertinent to health information seeking.

The research framework of the present study was developed by making use of the models for discussion sections reviewed above. Due to their generic nature and applicability across diverse disciplines, the constituents identified by Peacock (2002) and Al-Shujairi et al. (2019) were particularly important. For the empirical analysis of the content of discussion sections in articles examining health information seeking, the following constituents identified by Peacock (2002) appeared to be relevant:

- Expected or unexpected outcome (comment on whether the result is expected or not)

- Explanation (reasons for expected or unexpected results)

- Claim (contribution to research, sometimes with recommendations for action)

- Limitation, and

- Recommendation (suggestions for future research).

In addition, from the model developed by Al-Shujairi et al. (2019), the following constituents were relevant for the empirical analysis:

- Background information

- Reference to previous research

- Implication, and

- Summary of results

Differently from the models reviewed above, the present study will not examine the order in which the constituents of the discussion section appear in the texts. As the study focuses on the constituents´ content, the order in which the content is presented in the discussion sections is of secondary importance. The preliminary analysis of the empirical material of the present investigation also revealed that the differentiation between moves and steps would not bring additional value to the analysis focusing on the constituents´ content. It is sufficient to operate at a more general level by approaching the linguistic and rhetorical units pertinent to the content of discussion sections in terms of *constituents*. The research framework was substantiated by including additional constituents identified inductively from the empirical data of the present study, that is, the sample of 100 articles examining health information seeking. These constituents deal with the ways in which researchers interpret their findings and compare them to the results of prior investigations. More specifically, the following constituents are relevant in this regard:

- Comparison with prior studies: describing similarities

- Comparison with prior studies: explaining similarities

- Comparison with prior studies: describing differences

- Comparison with prior studies: explaining differences

In addition, the following constituents depicting the ways in which researchers reflect their contributions as a whole were identified inductively from the research material:

- Identifying gaps in prior research

- Offering an empirical contribution

- Offering a contribution to the development of models and/or theories

- Offering a methodological contribution

The research framework of the present study was finalised by taking the constituents identified by Peacock (2002) and Al-Shujairi et al. (2019) as a point of departure. However, some of the constituents were renamed more informatively for the needs of the present investigation. For example, the constituent of "*Expected or unexpected outcome (comment on whether the result is expected or not)*' (Peacock, 2002) was renamed as *Interpreting individual findings*, while the constituent of *Background information* (Al-Shujairi *et al.*, 2019) is referred to as *Offering background information about the study and its context*. The initial framework was substantiated by adding the constituents inductively identified from the empirical material. Although the specific order of the constituents in discussion sections will not be examined, the constituents are divided into three groups reflecting the major parts of discussion sections. Dudley-Evans (1994) identified three macro-level parts of the discussion section, that is, introduction, evaluation, and conclusion. For the purposes of the present investigation, these parts were correspondingly renamed as *Introduction*, *Interpretation of findings*, and *Specification of contributions and limitations*. The research framework is specified in Table 1. The illustrative examples of the constituents are taken from the empirical material of the present investigation.

| Part and constituent of discussion section | Illustrative example taken from the research material |
|---|---|
| *Introduction* | |
| Offering background information about the study and its context | "This cross-sectional study examined the factors associated with internet health information-seeking among US adults with diabetes". (Article 14) |
| Summarising the key findings | "The main findings of this study shows that among diabetic patients, the primary sources of health-related information were physicians, followed by television, friends and magazines". (Article 21) |
| *Interpretation of findings* | |
| Interpretation of individual research results | "Likewise, teachers were mentioned a few times as credible health information sources because of their expertise and education". (Article 26) |
| Comparison with prior studies: describing similarities | "This is agreement with other studies (e.g., Sak and Schulz, 2018) reporting that the internet might be more useful for general-purpose health questions". (Article 33) |
| Comparison with prior studies: explaining similarities | "The result of the present study is more in line with that of Johnson et al. (2015), possibly because the nature of the student sample, which was not year-specific". (Article 71) |

| Comparison with prior studies: describing differences | "Conversely, Indonesian Gen Z reported social media as the main source of COVID-19 information (Roselina et al., 2021)". (Article 76) |
|---|---|
| Comparison with prior studies: explaining differences | "On the contrary, a study in Sweden suggested that caregivers´ OHIS behavior was a protective factor against delays before treatment. These inconsistent results may be due to differences in study sites and cancer types". (Article 85) |
| *Specification of contributions and limitations* | |
| Offering an empirical contribution | "By analysing Haodaifu Online cases, this study provides a comprehensive ad in-depth understanding of consumers´ health information consultation patterns with the participation of OHC, offering a new and unprecedented perspective for the research of consumer health information behavior". (Article 89) |
| Offering a contribution to the developments of models and/or theories | "The research contributes a holistic model based on solid empirical findings to illustrate the whole process from emergence of needs (i.e., context) to the information contents and the resources needed to satisfy the need". (Article 42) |
| Offering a methodological contribution | "Our coding scheme appears far wider than others available in the literature". (Article 68) |
| Presenting practical implications | "Therefore, physicians should provide patients with informational and emotional social support through OHCs to improve patient compliance". (Article 47) |
| Identifying gaps in prior research | "Only a few studies analysed Web-based health information seekers for an acute symptom and the impact of such information on one's health". (Article 4) |
| Assessing the limitations of the study | "Our findings may not be directly generalizable to other countries because this study was conducted only in Japan". (Article 54) |
| Suggesting topics of further research | More studies are needed to address other types of health information that older adults might seek, such as information on environmental health and disease prevention". (Article 100) |

**Table 1.** The research framework

While discussing their findings, the researcher can make use diverse ways to reflect the contributions of an article. In the introductory part of the discussion section, they may offer background information about the goals of the study, as well as summarise the key findings. Thereafter, in the middle part of the section, the research findings are interpreted. To this end, the findings may be compared to the observations of prior studies by depicting similarities and differences. A more analytical way to interpret the findings is to explain why they are consistent or inconsistent with prior results. In the concluding part, the researcher moves from the interpretation of individual findings to the specification of their significance as a whole. This can be done by showing how the results offer an empirical, theoretical, methodological and/or practical contribution. In the final part, based on their findings, the researcher can also identify gaps in prior research, assess the limitations of the study, as well as suggest topics for future research.

## Research questions

To examine how researchers in the domain of health information seeking crystallize their contributions and reflect their significance, the present study draws on the research framework

presented in Table 1. More specifically, the present investigation seeks answers to the following questions.

- RQ1. In which ways do researchers offer background information of their investigation and summarize the findings in the discussion sections of articles examining health information seeking?

- RQ2: In the discussion sections, how do researchers interpret their findings?

RQ3. In the above sections, how do researchers specify their contributions to health information seeking studies as a whole?

# Empirical data and analysis

The empirical research material was identified in April 2024 by searching *Library and Information Science Abstracts* (Proquest). This database was chosen because it extensively covers studies on information-seeking behaviour occurring in diverse contexts. Using the search term *health information seeking*, the database searches were directed to the abstracts of the articles on the above topic. For clarity and to avoid terminological ambiguity, the search term *health information searching* was not used. This is because researchers sometimes use it interchangeably with the term *health information seeking*, without specifying how health information searching differs from health information seeking (Bachl *et al.*, 2024). In the searches, three criteria were employed in order to identify pertinent material. First, the topic´s *relevance* was used as criterion. Second, the searches were limited to *peer-reviewed articles*, thus leaving out material of other types. Third, only articles published *in English* were included in order to ensure that the terminology used in the articles is comparable. By the above criteria, a sample of the 100 first articles of the search list was downloaded for a closer review. The sample appeared to be sufficient for the needs of a qualitative study because the material became saturated. It became evident that the inclusion of additional articles would not have essentially changed the qualitative picture of the discussion sections of articles examining the issues of health information seeking.

The 100 articles were published in 27 diverse journals within the period of 2009-2024. Examples of the titles of the articles include "Laypeople's source selection in online health information-seeking process" and "The association between health information seeking on the Internet and physician visits". The list of articles is presented in Appendix 1. The most frequent publication forums of the articles were *Journal of Medical Internet Research* (30 articles), *Journal of Documentation* (13 articles), *Aslib Journal of Information Management* (8 articles), *Library & Information Science Research* (6 articles) and *Online Information Review* (5 articles). The rest of the articles were scattered amongst a number of journals, for example, *Information Research*, *Journal of the Association for Information Science and Technology*, and *Health Communication*. Of the 100 articles, 71 were based on quantitative research (e.g., questionnaire surveys), while 12 articles were qualitative investigations based on the analysis of interview data. Moreover, 12 articles were systematic literature reviews, and 5 articles drew on the mixed methods approach. The length of the discussion sections varied between 569 and 3626 words. On average, a discussion section contained 1468 words. There was some variation in the ways in which the authors employed *guiding* subtitles in the discussion sections in order to orient the readers. For example, in the Journal of Medical Internet Research, most discussion sections were initiated with a text paragraph placed under the subtitle of *Principal findings*. In addition, the authors employed various subtitles such as *Comparison with prior work*, and *Strengths and limitations*. It is probable that subtitles such as these were used simply because the instructions for authors published by Journal of Medical Internet Research explicitly require that '*the following format ("IMRD Format") must be used for the paper*' and that Discussion is structured using '*e.g., the subheadings "Principal Results", "Limitations", "Comparison with Prior Work", "Conclusions*' (https://www.jmir.org/author-information/instructions-for-authors). In other journals, for example, the Journal of

Documentation, and Library & Information Science Research, there were no guidelines for the authors about how to structure the discussion section. Therefore, it is understandable that in these journals, the use of subtitles varied from an article to another, while many discussion sections lacked subtitles entirely.

Following the advice of Basturkmen (2012, p. 136), the downloaded articles were first read in their entirety. This was done to avoid a partial understanding of the discussion sections. Thereafter, the discussion sections were read twice to obtain a preliminary picture of their content. The study was continued by conducting a preliminary coding of the material by making use of the constituents identified by Peacock (2002) and Al-Shujairi et al. (2019). The material was coded by the present researcher; there were no other coders. As noted above, the coding scheme was substantiated by adding constituents inductively identified from the research material, for example, '*Comparison with prior studies: explaining similarities*', and '*Offering an empirical contribution*'. In the second phase of the coding, all relevant text portions (sentences and text paragraphs) were equipped by codes indicative of the constituents specified in Table 1 so that an individual code was used one or more times within a discussion section. For example, every single research finding interpreted by the author of an article was coded separately, as well as every theoretical implication specified by the researcher. However, sentences in which the authors returned to individual research results already depicted in the findings section - without interpreting them in any way - were excluded from because these text portions did not offer new content to the discussion section. The coding was refined and checked several times by the present author until it was concluded that the codes appropriately cover the whole research material and that there are no anomalies. More specifically, to strengthen the reliability of the coding, the initial coding was refined by repeated reading of the data. During this process, the methodological recommendation of Miles and Huberman (1994, p. 65) was followed: the careful checking of the codes is a useful method for the lone researcher if the code-recode consistencies reach at least 90%. Following this advice, the coding was refined until it was found that the codes appropriately describe the data and that there are no anomalies.

The coded material was analysed both quantitatively and qualitatively by the present author. First, to obtain an indicative quantitative picture of the content of discussion sections, the distribution of the codes assigned to the constituents was calculated by means of descriptive statistics. The analysis was refined by means of qualitative content analysis (Zhang and Wildemuth, 2016). More specifically, attention was directed to the variation in the constituents´ content. The analysis of the variation was initiated by the identification of similarities and differences in the ways in which the authors depicted such content per constituent, for example, while summarizing the key findings and reflecting the empirical contribution. In the next phase of the analysis, the focus was placed on the comparison of such similarities and differences per constituent. This enabled the scrutiny of the various ways in which the authors, for example, explained why their findings are consistent with earlier studies on the topic or how the research results contribute to the development of models for health information seeking.

## Findings

### Quantitative overview

Table 2 specifies how the authors of the 100 articles devoted attention to the diverse constituents of the discussion section.

| Constituent | % |
|---|---|
| Interpreting individual research results | 27.9 |
| Describing similarities of findings | 16.4 |
| Suggesting topics for future research | 9.9 |
| Assessing the limitations of the study | 9.5 |
| Presenting practical implications | 8.0 |
| Offering background information | 5.8 |
| Offering an empirical contribution | 4.9 |
| Summarizing the key findings | 4.9 |
| Identifying gaps in prior research | 3.6 |
| Describing differences of findings | 2.9 |
| Offering a theoretical contribution | 2.5 |
| Explaining differences of findings | 2.4 |
| Offering a methodological contribution | 0.7 |
| Explaining similarities of findings | 0.6 |
| In total | 100.0 |

**Table 2.** Percentage distribution of the codes assigned to the constituents
of the discussion sections (n=1388).

Table 2 indicates that the most frequent ways to discuss the contributions were the interpreting of the individual research results, followed by the description of similarities with prior findings. In addition, the authors often identified topics of further research, pondered practical implications of their findings and reflected the limitations of their studies. To compare, less attention was devoted to the theoretical implications, and the explanation of the similarities of findings. Regarding the diverse parts of the discussion section, the constituents of the introductory part offering background information about the study and summarizing the findings covered 10.7% of the codes assigned to the material. The middle part of the discussion section dealing with the interpretation of the findings occupied a major role, comprising altogether 50.2% of the codes. The concluding part focusing on the reflection of the contributions as a whole, as far as the identification of limitations of the study and topics of further research covered 39.1% of the codes. In the final part, the main attention was devoted to the topics of future research, the assessment of the limitations of the study and the depiction of the practical implications, thus leaving less room to the reflection of the empirical, theoretical, methodological contributions of the study.

## Qualitative features of discussion sections

### Introduction.
Table 2 indicated that from the quantitative point of view, the introductory part occupied a relatively modest role in the discussion sections. Typically, they were initiated by a short repetition of the main goal of the investigation. To put the study in a broader context, the authors also offered background information about their research approach. In this regard, the introductory part mirrored the introductory chapter of the article, as the authors returned to the description of the points of departure of their investigations.

*The primary purpose of the present study is to develop an understanding of the health and lifestyle information behaviour of Icelanders, with special emphasis on social media and its role in information behaviour today.* (Article 61)

*This cross-sectional study examined the factors associated with internet health information-seeking behavior among US adults with diabetes.* (Article 14)

Another constituent of the introductory part is the summary of the key findings of the study. This constituent was easy to identify in cases in which the discussion sections were equipped with subtitles such as *Principal findings* or *Summary of results*. The content of the summaries varied widely, depending on the research topic. Sometimes, to attract the reader's attention to the most important results, attributes such as "main" and "major" were used.

*The main finding of this study shows that among diabetic patients, the primary sources of health-related information were physicians, followed by television, friends, and magazines.* (Article 21)

### Interpretation of findings.

Table 2 suggests that researchers tend to direct their main attention to the middle part of the discussion section. No less than 50.2% of the codes assigned to the constituents deal with the interpretation of individual research results. To this end, one of the popular strategies used by the authors was to emphasize the unique nature of a finding. It was claimed that for the first time in health information seeking studies, a phenomenon or a connection between phenomena is revealed.

*This study is the first to show that internet users with chronic lung diseases are more likely to watch a health-related video on YouTube.* (Article 53)

Another way to emphasize the novelty value of a finding was to refer to its unexpected nature. Usually, the *surprise* value was explained by depicting how a unique context of health information seeking influenced one's source preferences.

*Surprisingly, friends and family (personal network) was not a favorite source for COVID-19 related information. This may be because the COVID-19 situation is new for us, and no one had enough information in a household.* (Article 76)

Even though a finding would be unsurprising, it may offer a novel viewpoint to health information seeking because the research result makes understandable how contextual factors hinder or facilitate the identification of information sources.

*The results show how education is an important factor with regards to the use of the Internet in searching for health-related information. This was expected because educated individuals and those who can afford digital devices or computers have greater access to the Internet.* (Article 99)

The interpretation of the contributory value of a finding can also made by explaining why health information seeking occurs in a certain way. To achieve this, the authors identified reasons for such behaviour. This approach was characterised by the use of the words *because of*, indicative of the factors behind the attempts to seek health information.

*They found it easier to seek COVID-19 information because of two reasons. First, distinguishing reliable from unreliable information was not difficult, as authoritative government healthcare institutions consistently provided accurate information that needed to be followed up. Second, the availability of COVID-19 information in multiple languages eliminated any language-related challenges.* (Article 17)

The comparison of findings with prior studies appeared to be a popular strategy in the interpretation of individual research results. Most commonly, this was made by depicting the similarities between one´s finding and the observations of studies conducted by others. The comparison of similarities offers a way to confirm the relevance of prior observations about health information seeking. In most cases, comparison by similarity was simply made by describing one´s finding and then suggesting that it aligns with the observations of an earlier investigation.

> *The results are similar to the findings from some prior studies, which found that there were still many people who prefer to use traditional media (e.g., books, newspapers) or healthcare professionals as their primary sources for seeking health information (Allen et al., [2]; Rains, [43]). (Article 96)*

The findings can also be interpreted by explaining the similarity of the results with the observations of prior studies. This approach was used rarely. It is easier to describe similar findings than trying to find out why they are similar. On the other hand, the explanation of the similarities is easier if prior studies have identified almost identical connections or parallels between the factors of health information seeking.

> *This finding is consistent with previous studies, which confirmed that mothers are very active health information seekers (Bernhardt & Felter, 2004; Skranes et al., 2014). This may be explained by the mothers' role as health managers for their family members (Lee, 2016; Moon et al., 2019; Yoo, 2004). (Article 37)*

Again, the explanation of the similarities may not lead to the identification of a full correspondence because prior investigations can be based on different research approaches. However, the similarities may be sufficiently comparable so that the explanation is meaningful.

> *The result of the present study is more in line with that of Johnson et al. (2015), possibly because of the nature of the student sample, which was not year-specific. (Article 70)*

While interpreting their findings, the authors quite seldom described the differences between research results. This may be due to the motivation to seek confirmatory support for one´s findings by depicting consistent results, rather than refer to contrary evidence that may challenge the conclusions drawn by the author. Nevertheless, the interpretation of a finding can dig deeper if contrasting results are explained in some way. This strategy is cognitively demanding, and it was used quite seldom. No conclusive explanations were developed; rather, the authors offered general level assumptions of possible reasons, using cautious expressions such as 'this may be because', and 'it is possible that'. Commonly, differing or contrasting findings were made understandable by referring to diverse research approaches and different research populations.

> *However, only 7.8% of our survey respondents reported online health information seeking behaviors, which is significantly lower than the national data [35]. There are several potential reasons for this difference. First, Washington Height and Inwood are designated as medically underserved areas. (Article 39)*

**Specification of contributions and limitations.**
For the reflection of the contributions and implications of the research findings as a whole, the concluding part of the discussion section is particularly important. Often, this part is the most demanding part for the writers because they have to enhance the abstraction level in order to reflect the significance of their findings more generally. As most of the articles examined in the present study reported empirical findings, the reflection of their contributory value was common in the discussion sections. The simplest way to highlight contributions of this type is to claim that the investigation pioneers in the analysis of a particular issue of health information seeking.

*This is the first study exploring primary care patients' online health information-seeking behavior in Hong Kong. It provides a comprehensive and up-to-date quantitative picture of online health information seeking for primary care doctors to understand their patients' health information needs, which they might not disclose to doctors. (Article 86)*

The authors also detailed how their empirical contributions added to the literature of health information seeking. To highlight the significance of the empirical contributions to this domain, the authors used expressions indicative of the unique nature of the findings.

*By analyzing Haodaifu Online cases, this study provides a comprehensive and in-depth understanding of consumers' health information consultation patterns with the participation of online health communities, offering a new and unprecedented perspective for the research of consumer health information behavior. (Article 88)*

The nature of the empirical contributions can also be detailed by specifying factors that were elaborated in the investigation. To this end, references to statistical analysis offered additional evidence about the significance of empirical results. Another strategy to highlight the importance of the contribution was to claim that the empirical results can be generalized to concern information seeking among people suffering from health problems.

*The diversity of our participants' backgrounds, the number and types of chronic health conditions of our participants, and the match between our prominent manifest level themes with other studies suggest that our findings could be transferable to a wider population of consumers with chronic health conditions who use the Internet to find health information. (Article 40)*

The analysis of the discussion sections revealed that the authors seldom reflected their theoretical contributions. This may be due to that the elaboration of the existing models for health information seeking, merely drawing on one´s empirical findings, is a demanding task. Nevertheless, there were a few attempts to depict how the findings could be used to complement or refine the existing models by directing attention to individual factors of health information seeking. Characterizations of this kind offered a more convincing picture of a particular theoretical contribution in light of prior attempts to model a phenomenon. The theoretical contributions were also depicted by making references to individual constituents of models for health information seeking. In addition to models, the theoretical contributions can deal with related constructs such as predictors, taxonomies and categorizations of phenomena related to health information seeking.

*Overall, the results of the multigroup comparison suggest that the relative importance of predictors of gender-related web-based HISB (=health information seeking behaviour) differs depending on individuals' gender. Therefore, considering gender more thoroughly is a valuable extension for theory-based modelling of web-based HISB. (Article 44)*

To compare, methodological contributions were more seldom presented. Contributions of this type ranged from the development of the coding systems to the novel ways of data gathering and the analysis of empirical data. The added value of the methodological contribution to health information seeking studies was also emphasized by drawing attention to the benefits of the new methodological approach and its potential in future studies on the topic.

*This study has taken a novel methodological approach to analyze the actual use data to examine cancer patients' online information searching behaviors. By tracking the time and the URL of all the CHESS information service web pages visited, this study was able to investigate patients' online information seeking patterns in greater detail. (Article 30)*

Table 2 indicated that the authors tended to look at the practical implications of their findings. Again, their content varied widely, depending on the research topic. However, four major themes

dominated the discussion about practical implications: the design and development of information services, the provision of health information, the provision of informational, emotional and social support for the information seekers, and the advancement of health information literacy. Some of the practical suggestions were presented at a general level, without detailing how they could be realised while designing and developing information services, for example. However, most authors specified how their research findings could be applied in the design and development of information services or the provision of health information.

> *Our findings provide evidence of the value of creating support services that incorporate peer mentors to teach people newly diagnosed with dementia how to search for information to meet their physiological, social, and emotional information needs.* (Article 13)

One of the constituents of the concluding part is the assessment of the limitations of the study. Many of them concerned the ways in which the empirical data were gathered. The limitations dealing with the sample were also reflected in the evaluations concerning the generalisation of the findings.

> *Although the study sample was representative of the whole clinic population, it is skewed toward younger and more educated patients. Thus, the study's external validity is reduced.* (Article 86)

The identification of the limitations did not merely disclose potential weaknesses of a study. It is possible to look forward and implicate how the limitation can be overcome in future investigations. For example, the sample may be widened to include additional groups of people. Closely, related, one of the ways to reflect the contributions of the study is to identify gaps in prior research and to suggests ways in which they could be overcome in future investigations. To this end, the authors emphasized the pioneering role of their studies.

> *Most of the previous studies have been conducted in the western context while this study is amongst a few attempts to explain the young adults' behavior regarding online health information seeking and sharing in a developing country context.* (Article 48)

The analysis revealed that the identification of the needs and topics of future studies represents a logical final constituent of the discussion sections. As noted above, references to future studies can also made while reflecting how the gaps in prior research could be filled or how the limitations of a study could be overcome. Given the abundance of research topics of the 100 articles analysed in the present study, the content of the suggested future studies varied considerably. Again, there were differences in the specificity of the suggestions. Some of them just named a research topic, without justifying why research should be directed to a particular issue. However, based on their own findings, most authors specified the reasons for the need of further investigations. For example, suggested topics for future research can be justified by referring to the need to refine models for health information seeking. Similarly, future research may be needed to test models proposed by the authors or to compare the empirical findings. Due to such specifications, the suggestions for further research could be justified more strongly.

> *One of the study findings that Finnish people used social media less frequently for seeking COVID-19 related information opens the direction to future research. It is imperative to conduct explanatory research to understand the reasons for the low use of social media for health information seeking by Finnish people.* (Article 76)

## Discussion

Drawing on the ideas of genre analysis, the present study elaborated the picture of the ways in which researchers in a particular domain reflect their contributions in the discussion sections of scholarly articles. While genre-based studies have offered a detailed view on the structure and

constituents of discussion section, the present investigation demonstrated how researchers fill the structural constituents with content in the domain of health information seeking. More specifically, the present study adds knowledge about how researchers in the above domain realise the norms of scholarly writing by generating content for the "containers" represented by diverse constituents in discussion sections. The main findings of are summarized in Table 3.

| Part and constituent of discussion section | Main features of the constituent´s content |
|---|---|
| *Part I: Introduction (RQ1)* | |
| Offering background information about the study and its context | Concise repetition of the points of departure of the study |
| Summarizing the key findings | Short description of the most important research result(s) |
| *Part II: Interpretation of findings (RQ2)* | |
| Interpreting individual research results | Explaining the novelty value of a research result<br>Explaining the value of an expected (unsurprising) finding<br>Considering the importance of a finding for the contextual understanding of health information seeking |
| Comparison with prior studies<br>- describing similarities | Showing how a finding is consistent with an observation of a prior investigation on the topic |
| - explaining similarities | Seeking confirmatory support to one´s finding<br>Drawing on similar contexts of information seeking or similar groups of people seeking health information<br>Explaining partial similarity between findings by referring to different research populations |
| - describing differences | Depicting how one´s research result differs from an observation of a prior study |
| - explaining differences | Drawing on different contexts of information seeking or referring to different research populations |
| *Part III: Specification of contributions and limitations (RQ3)* | |
| Offering an empirical contribution | Demonstrating how the study pioneers in the domain of health information seeking<br>Explaining how the empirical findings add knowledge about health information seeking<br>Explaining the extent to which the empirical findings are statistically representative or generalizable |
| Offering a contribution to the development of models and/or theories | Specifying how the findings refine models for health information seeking by adding new components or identifying predictors<br>Explaining the value of new taxonomies and categorizations of health information seeking |
| Offering a methodological contribution | Demonstrating the value of the novel ways to gather, code and analyse the empirical data |
| Presenting practical implications | Describing how the research findings can be used to design and develop information services, provide health information more effectively, support information seekers and advance health information literacy |

| | Identifying research topics ignored in earlier studies |
|---|---|
| Identifying gaps in prior research | Demonstrating how one´s research findings can fill the gap |
| Identifying and assessing the limitations of the study | Depicting the limitations regarding data gathering and the generalizability of the findings |
| Suggesting topics for further research | Proposing topics for future investigations by drawing on gaps in research or based on one´s own findings |

**Table 3.** Summary of the main findings

The present sought answers to three research questions. First, it was asked how do researchers offer background information and summarize their findings in the discussion sections? In this regard, as Table 3 suggests, the research results are unsurprising. Researchers write the introductory part to remind readers about the research goal of the study and to direct their attention to the key findings of the investigation. Following the academic convention, the introductory part is usually commonly kept concise because it represents a necessary first step on the way to the core content of the discussion.

The second research question focused on the ways in which researchers interpret the individual key findings. This occurs in the middle part of the discussion section. First, while interpreting individual research results, the writers emphasized their novelty or surprise value; a phenomenon or relation is identified for the first time in health information seeking studies. Second, an individual finding was interpreted by drawing on descriptive comparison, that is, depicting similarities and differences between one´s finding and prior research results. The popularity of similarity description suggests that researchers prefer a conservative approach to the interpretation of their findings. The emphasis is placed on their confirmation in light of prior observations, rather than exposing one´s finding to opposing or contradictory evidence offered by earlier investigations. Third, an individual finding was interpreted using explanatory comparison. To this end, the researcher explicated why his or her finding is consistent or inconsistent with prior observations. Explanatory comparison was employed quite seldom, probably because this approach is cognitively more demanding than descriptive comparison.

Finally, the third research question dealt with the concluding part of the discussion section, that is, the ways in which researchers specify their contributions to health information seeking studies as a whole. In this regard, four major strategies were identified. First, the writers evaluated how their findings refined or complemented the empirical picture of health information seeking by identifying new phenomena or statistically significant relationships between variables. Second, researchers specified how their findings resulted in the elaboration of models for health information seeking or offered a new methodological viewpoint to health information seeking studies. The specification of the contributions to model development and methodology were rare, thus suggesting that they are cognitively demanding tasks, requiring that the researcher is able to rise above his or her individual research results. Third, the writers reflected the practical implications of their findings. This is not necessarily easier than the pondering of the theoretical implications because practical suggestions are more convincing if the writer is able to demonstrate how his or her findings can be applied to the design of a particular information service, for example. Fourth, the contributions were specified by identifying the limitations of the study and explaining how they could be overcome in future investigations. Closely related, the identification of gaps in prior studies served the same end because the lack of investigations in a domain is indicative of a potentially relevant research topic.

Given that the present study pioneers in the analysis of discussion sections dealing with health information seeking, there is a paucity of prior investigations offering opportunities for comparative notions. The findings support Hyland´s (2008, p. 3) assumption about researchers´ ways to draw on the *'persuasive practices of their discipline, encoding ideas, employing warrants, and framing arguments in ways that their potential audience will find most convincing'*. The discussion sections examined in the present study indicate that the persuasive practices include, for example, the highlighting of the novelty value of the findings, thus convincing the readers about the relevance of research approach. The findings also lend support to the conclusion drawn by Arsyad *et al.* (2020, p. 294) and Avidan, Ioannidis and Mashour (2019, p. 414) They claimed that writers tend to refer to the findings of prior studies in order to demonstrate that their own investigation is an integral part of a relevant research tradition and that their findings constructively add knowledge to it. This preference was clearly evident, as the authors favoured the seeking of confirmatory support rather than contrary evidence while comparing their findings with earlier investigations. While reflecting the contributory role of discussion sections, Kearney (2017, p. 290) likened an informative discussion section to a "road map" which is capable of demonstrating for the readers *'where they are after this study, in comparison to where they were before'*. The discussion sections examined in the present study seldom achieved this goal. This is mainly due to the paucity of reflection focusing on the theoretical contributions of a study. Investigations based on the systematic review of health information seeking studies fared better in this regard because they disclosed gaps in research and suggested topics of future research.

The findings of the present study, as well as the comparative notions have theoretical implications for the analysis of the discussion sections. The models developed in the domain of genre analysis offer a firm basis for the identification of the constituents of discussion sections, as well as the scrutiny of the order in which the constituents appear in the texts. As the genre analytic approaches are focused on the structure of the scholarly articles, there is a need to refine the analysis of the content of the constituents. To this end, the Argumentative Zoning (AZ) theory developed by Teufel (1999) offers useful conceptual and methodological tools. AZ is an analysis of the argumentative and rhetorical structure of a scientific paper (Teufel, Siddhartan and Batchelor, 2009, p. 1493. One of the strengths of AZ is that it enables a sentence-by-sentence classification with mutually exclusive categories from the annotation scheme incorporating categories such as Aim, Background, Basis, Contrast, Own, and Textual. For example, the category of Aim points out the paper's main knowledge claim, a rhetorical move which may be repeated in the introductory section and Discussion, while the category Textual explains the physical location of information, e.g., by giving a section overview or presenting a summary of a subsection.

The findings also have practical implications for the writers of discussions sections. They could be enhanced by directing more attention to the reflection of contrasting evidence in order to test the relevance of interpretations. Moreover, there is a need to employ more deeply analytical strategies based on the explanatory comparison. This approach is cognitively more demanding than description and comparison; however, it can enable digging deeper, possibly leading to the identification of new connections between one´s findings and the observations of prior research on the topic. There is also a need to demonstrate in more detail how one´s findings would contribute to the conceptual and theoretical development in a domain. This would serve the ends of cumulating knowledge in a field because the findings would be put into a broader context and thereby be used more effectively in future investigations on the topic.

Basturkmen (2012, p. 143) has made useful suggestions for future studies on discussion sections. Interviews with the writers could offer useful information about the ways in which researchers compose the discussion sections. Interviews would be most effective if they are directed to a recently written discussion section because the authors could be able to recall better the writing process. Examples of relevant interview questions include, why was the discussion section composed in a certain way, how was the content of the text drafted and finalized, and how did the

author draw on diverse strategies to reflect his or her contributions? On the other hand, the writers may find such interviews demanding because much of the knowledge used by the researcher is likely be tacit, thus subject to intuitive thinking and insights that arose during the writing process. Therefore, it is possible that the authors cannot recall and articulate exactly how they *filled* the various constituents of the discussion with particular content. Nevertheless, the interview data would offer valuable material for the elaboration of the picture of the scholarly writing process and academic conventions behind it.

## Conclusion

Discussion sections occupy a significant role when researchers reflect their empirical, theoretical, methodological and practical contributions. The present investigation pioneered by demonstrating how researchers in the domain of health information seeking interpret their findings. The results highlight that in the above domain, the authors tend to prefer a conservative approach by seeking confirmatory support from prior studies. As the present investigation focused on a sample of 100 discussion sections, the results do not offer a generalizable picture of the content of such sections in the domain of health information seeking. Thus there is a need to expand the analysis by examining how researchers generate and justify their contributions in diverse subdomains of information behaviour research. Another topic of future research is a more detailed analysis of the content of individual constituents, for example, the articulation of theoretical and practical implications. Examples of the topics of future studies also include the comparison of discussion and conclusion sections. The comparative approach is meaningful because conclusion sections may have unique elements. Lamanauskas (2021, pp. 7-8) referred to them by suggesting that ideally, conclusion sections are able to express the *'purification of the gist of the research carried out'*. Similar to an effective final paragraph of a discussion section, Conclusion can offer a "take-home message", that is, a crystallised description of the main contribution of an investigation.

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## About the author

**Reijo Savolainen** is Professor Emeritus at the Faculty of Information Technology and Communication Sciences, Tampere University, Finland. His main research interests are in the theoretical and empirical issues of everyday information practices and information behaviour. He can be contacted at Reijo.Savolainen@tuni.fi

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## Copyright

## Appendix I. Research material

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