Use of *that*-clauses in research articles: Variation across paradigms and disciplines in in-text sections

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Abstract

That-clauses allow academic writers to make arguments and persuade readers to accept them. The use of *that*-clauses has been widely studied in terms of disciplinary variation in research writing. One limitation of these previous studies is that they have not considered the potential variation in qualitative, quantitative, and mixed methods research paradigms within disciplines, as the potential influence of research paradigm will make it unable to determine whether the observed variation is best explained in terms of disciplinary conventions, of paradigmatic influence, or of both. This study explores the paradigmatic and disciplinary influences on the use of *that*-clauses in five research article (RA) sections of Introduction, Methods, Results, Discussion, and Conclusion, focusing on three research paradigms of qualitative, quantitative, and mixed methods RAs in two disciplines of nursing and psychology. Considering the factor of research paradigm makes it possible to determine to which factor the observed variation in the use of *that*-clauses is related. Besides, the existence of paradigmatic variation found in this study calls into question how reliable the results are in an unbalanced corpus where research paradigms are not differentiated.

Keywords: *That*-clauses, academic writing, variation, research articles, research paradigms.

Resumen

El uso de oraciones subordinadas con "that" en artículos de investigación: Variación entre paradigmas y disciplinas en las secciones del cuerpo de texto

Las oraciones subordinadas introducidas por *that* permiten a los autores académicos formular argumentos y persuadir a los lectores para que los acepten.

El uso de estas oraciones ha sido ampliamente estudiado en términos de variación disciplinaria en la escritura de investigación. Una limitación de estos estudios previos es que no han tenido en cuenta la posible variación entre los paradigmas de investigación cualitativa, cuantitativa y de métodos mixtos dentro de las disciplinas, ya que la posible influencia del paradigma de investigación dificulta determinar si la variación observada se explica mejor por las convenciones disciplinarias, por la influencia del paradigma de investigación o por ambas. Este estudio analiza las influencias paradigmáticas y disciplinarias en el uso de oraciones con *that* en cinco secciones de artículos de investigación: Introducción, Métodos, Resultados, Discusión y Conclusión. Se centra en tres paradigmas de investigación cualitativa, cuantitativa y de métodos mixtos, dentro de dos disciplinas: enfermería y psicología. La consideración del paradigma de investigación como factor permite determinar con qué factor está relacionada la variación observada en el uso de las oraciones con *that*. Además, la variación paradigmática hallada en este estudio pone en duda la fiabilidad de los resultados en un corpus desequilibrado, donde no se diferencia entre los paradigmas de investigación.

Palabras clave: Oraciones con *that*, escritura académica, variación, artículos de investigación, paradigmas de investigación.

1. Introduction

The view of academic writing as evaluative and interpersonal, rather than objective and impersonal, has gained growing popularity in EAP research (Hyland & Tse, 2005a; Jiang & Hyland, 2015). Evaluative and interpersonal features, such as hedges (Vold, 2006), boosters (Peacock, 2006) and reporting verbs (Luzón, 2018), have been studied to explore how academic writers intervene in their discourse to frame research findings and engage with their readers. One important interpersonal resource that academic writers can utilise to make arguments and persuade readers to accept them is *that*-clauses. *That*-clauses, a grammatical structure in which a *that*-complement clause is embedded in a super-ordinate clause, allow academic writers to "front-load utterances with attitudinal meanings and offer an explicit statement of evaluation of the proposition which follows" (Hyland & Jiang, 2018, p. 140).

The use of *that*-clauses in different disciplines has attracted considerable interest in the field of research writing (e.g., Hiltunen, 2010; Kim & Crosthwaite, 2019). These cross-disciplinary studies have contributed to our understanding of how disciplinary culture influences discourse organisation.

However, one limitation of these disciplinary investigations is that they have not controlled for the variable of research paradigm to consider the potential variation in qualitative, quantitative, and mixed methods research paradigms within disciplines. Such research designs are potentially problematic, as they ignore the possibility that research paradigms may influence the use of *that*-clauses and are therefore unable to determine whether the observed variation is best explained in terms of disciplinary norms, paradigmatic influence, or both. To empirically test whether research paradigm is a potentially relevant predictor of the use of *that*-clauses and further determine to which factor the variation should be ascribed, this study explores how academic writers signal stance via *that*-clauses varies across three research paradigms of qualitative, quantitative, and mixed methods research articles (RAs) and across the two disciplines of nursing and psychology.

2. Literature review

2.1. Research paradigms and academic writing

A research paradigm is defined as "a shared belief system or set of principles on what problems are to be investigated and how to investigate them" (Cohen et al., 2013, p. 13). Researchers may choose qualitative, quantitative and mixed methods depending on different research purposes (Creswell, 2014). Qualitative and quantitative research paradigms representing two ends of the research continuum differ in terms of assumptions, researcher's roles, purposes, and approaches (see Table 1).

	Qualitative	Quantitative
Assumption	Realities are multiple, constructed, and holistic. Knower and known are interactive, inseparable. Variables are complex, interwoven, and difficult to measure. Inquiry is subjective, value-bound.	Reality is single, tangible and fragmentable. Knower and known are independent. Variables can be identified and relationships measured Inquiry is objective, value-free.
Researcher role	Personal involvement Empathic understanding Emic (insider's point of view)	Detachment and impartiality Objective portrayal Etic (outsider's point of view)
Purpose	Contextualization Interpretation Understanding actors' perspectives	Generalizability Prediction Causal explanations
Approach	Researcher as the instrument Inductive Makes minor use of numerical data Descriptive write-up	Uses formal, structured instruments Deductive Relies on numerical data Abstract language in write-up

Table 1. Comparison of qualitative and quantitative paradigms (adapted from Yilmaz, 2013).

As Table 1 shows, qualitative research assumes a socially constructed reality where there is an interactive relationship between researchers and subjects, whereas quantitative research assumes a static and objective reality that is supposed to be independent of the subjects being studied. The different assumptions are associated with the distinct roles that researchers play. Qualitative researchers typically develop an empathic relationship with subjects, while a distance is put between quantitative researchers and subjects. These two paradigms also differ in terms of purposes and approaches (Breeze, 2023). The aim of qualitative research is to provide context and interpretation via inductive reasoning based on observation and interview. Qualitative research, which is highly context and case dependent, provides detailed and descriptive data to deepen the understanding of individual participants' experiences. By contrast, quantitative research is concerned with generalization, prediction, and causal relationships via deductive reasoning based on mathematical models and statistics. The statistical data are typically obtained by using standardized instruments such as close-ended questionnaires.

Along the continuum ranging from fully quantitative to fully qualitative, mixed methods research lies "somewhere in between" (Liu & Tseng, 2021, p. 2). It includes the characteristics of both qualitative and quantitative research, and focuses on collecting, analysing and mixing both quantitative and qualitative data in the research process (Kettles et al., 2011). The characteristics associated with these three research paradigms may lead to writers' diversified linguistic choices in academic writing (e.g., Kwan, 2021; Liu & Tseng, 2021).

An early study by Firestone (1987) compared a quantitative text and a qualitative text that conducted educational research on the same issue and identified rhetorical differences that were due to the epistemologies of positivism and constructivism. Despite the focus on the same issue, the two texts adopted different strategies to make research persuasive: the quantitative text stressed measurement procedures, whereas the qualitative text foregrounded interview findings. Epistemology-related differences were also shown in Hansen (1988), who compared a quantitative study in sociology and a qualitative study in anthropology and found that the quantitative text tended to hedge its knowledge claims, while the qualitative text was more assertive in its conclusions. Sallinen and Braidwood (2009) found more impersonal sentence subjects in two quantitative RAs compared to two qualitative RAs in nursing, which was interpreted as being due to the

objectivity of quantitative research. However, these generalisations have been somewhat impressionistic (Cao & Hu, 2014, p. 17), and they have been further enriched by the empirical findings of subsequent studies. In Cao and Hu (2014) and Hu and Cao (2015), the high frequencies of comparative transitions (e.g., *by contrast*), attitude markers (e.g., *as expected*), and directives (e.g., *see Figure 1*) observed in quantitative RAs in applied linguistics, education, and psychology were attributed to quantitative researchers' need to compare results with hypotheses, comment on whether actual empirical results turn out to be expected or unexpected, and direct readers to tables and figures for statistical results. Similarly, Gray (2013, 2015) found more process nouns (e.g., *formation*), abstract nouns (e.g., *model*), and passive voice verbs (e.g., *were examined*) in quantitative RAs than in qualitative RAs in applied linguistics and political science, which she interpreted as being due to statistical testing and hypothesis formulation in quantitative research. Furthermore, more recent work such as Candarli and Jones (2019) and Cao (2021) found the lexical bundles conveying a tentative stance (e.g., *are more likely to*) to be more frequently used in quantitative RAs than in qualitative RAs in education due to the possible explanations for causal relationships in quantitative research. Arizavi and Choubsaz (2021) explored citation practices in introductions of theoretical linguistics and applied linguistics RAs and found that qualitative researchers were more likely to rely on persona to add credibility and reliability to their standpoints than quantitative and mixed methods researchers.

Two areas have so far been relatively neglected in research on paradigmatic influences on academic discourse. First, with the exception of Cao (2021) and Arizavi and Choubsaz (2021), few studies have considered mixed methods research, an emerging but popular research approach (Kettles et al., 2011). Second, what remains to be seen is how the use of *that*-clauses, which has been generally overlooked as compared to other linguistic features (Kim & Crosthwaite, 2019), may vary across research paradigms. In what follows, how previous research explores *that*-clauses in academic writing will be discussed.

2.2. *That*-clauses and academic writing

That-clauses can occur with a variety of predicates. Disciplinary culture has been examined for the role it plays in the use of verbs taking *that*-clauses. Charles (2006) found *show* to be the most frequent verb taking *that*-clauses in materials science theses where knowledge is primarily achieved through

experimentation and *argue* to be the most frequent in politics theses where knowledge is constructed through text-based procedures. Hiltunen (2010) used Francis et al.'s (1996) meaning groups of verbs as the framework of analysis and found more frequent use of SHOW verbs (e.g., *demonstrate*, *show*) in medicine and physics RAs than in law and literary criticism RAs.

Alternatively, *that*-clauses can occur with adjectives or nouns, which have been examined in disciplinary writing. Charles (2007) showed a higher frequency of *N* + *that* pattern in politics theses than in materials science theses because politics writers' need to refer to political figures and entities increases the possibility of using this pattern. Hiltunen (2010) found a higher frequency of *N* + *that* pattern in RAs from two soft disciplines of law and literary criticism than those from two hard disciplines of medicine and physics. Similarly, Jiang and Hyland (2015) found more frequent use of *N* + *that* pattern in RAs from the soft disciplines of applied linguistics, marketing, sociology, philosophy than those from the hard disciplines of electronic engineering, medicine, cell biology, and physics due to the discursive and interpretive style of constructing knowledge in soft disciplines.

In addition to examining the predicates taking *that*-clauses, previous literature has also discussed the sources of *that*-clauses. *That*-complement clauses could occur in extraposed position (e.g., *it is important that*…), where the author "does not assume explicit responsibility for the attitude" (Biber et al., 1999, p. 661) and modal responsibility is assigned to "the dummy pronoun *it*" (Collins, 1994, p. 8). Some studies such as Hyland and Tse (2005a, 2005b) have comprehensively considered the sources of *that*-clauses: they classified the sources into human (e.g., *the author*), abstract (e.g., *the results*), and concealed (e.g., non-referential *it*) ones based on published RAs and student dissertations. Hyland and Tse's (2005a, 2005b) classification framework has been applied to explore disciplinary variation, which could be seen in Kim and Crosthwaite's (2019) finding that business RAs contained higher frequencies of human, abstract, and concealed sources than medicine RAs.

Besides evaluative source, Hyland and Tse (2005b) take a wider look at *that*-clauses by considering two other elements: evaluated entity and evaluative stance. In terms of evaluated entity, they grouped the propositions in subordinate clauses into four categories: "the authors' evaluation of their own findings, their evaluation of previous studies, their statement of research goals, and evaluation of the methods, models, or theories they had

drawn on in the research" (Hyland & Tse, 2005b, p. 129). In terms of evaluative stance, they considered attitudinal and epistemic stance. Hyland and Tse's (2005b) framework of evaluated entity and evaluative stance has been used to investigate how disciplinary conventions influence academic writing. One study of this kind was conducted by Kim and Crosthwaite (2019), who found that, as compared to medicine RAs, business RAs contained higher frequencies of every category of evaluated entity and more frequently conveyed attitudinal and epistemic stance via *that*-clauses because of the nature of explicit evaluation and interpersonal engagement in business studies.

Reviewing previous studies reveals that disciplinary variation in *that*-clauses has attracted much attention in academic writing. These cross-disciplinary investigations facilitate writers' understanding of how disciplinary norms influence research writing. However, one potential shortcoming of these studies is that they tend not to consider the potential influence of research paradigm within disciplines. In other words, it is implicitly assumed that research paradigm has no influence on the distribution of *that*-clauses, yet there is no previous research on which such an assumption could be based. And if this assumption turns out to be erroneous, it becomes unclear whether the observed variation should be ascribed to disciplinary conventions, paradigmatic influence, or both. The characteristics of the three research paradigms, each with its own assumptions, researcher's roles, purposes, and approaches, make it reasonable to argue that research paradigm may be a potential predictor of the use of *that*-clauses. For example, the different relationships between researchers and subjects in qualitative and quantitative research may influence who the authors attribute the evaluation to in *that*-clauses, and the different purposes of conducting qualitative and quantitative research may influence what is to be evaluated in *that*-clauses. Therefore, to empirically validate whether research paradigm is a relevant predictor of the use of *that*-clauses and determine to which factor the variation is related, this study explores variation in the use of *that*-clauses across three research paradigms of qualitative, quantitative, and mixed methods RAs and across two disciplines of nursing and psychology. The exploration of paradigmatic and disciplinary variation in *that*-clauses in this study will be performed in terms of in-text RA sections (Introduction, Methods, Results, Discussion, Conclusion), which will be explained below.

2.3. *That*-clauses and in-text RA sections

Authors of RAs typically realize communicative purposes by organising the content of principal RA sections, each of which plays distinct roles in the organisation of academic discourse. In the Introduction section of RAs, authors generally establish the importance of the topic being investigated, point out a gap in earlier research, and state the purposes of their research (Samraj, 2002). The Methods section of RAs, which acts as a bridge between reviewing relevant literature and presenting newly-obtained results, includes details about procedural steps and sufficient specification for replication studies (Cotos et al., 2017). The Results section of RAs deals with new knowledge obtained and is of a descriptive nature, whereas the Discussion section of RAs provides possible explanations for findings and is of an interpretive nature (Lin & Evans, 2012). In the Conclusion section of RAs, authors summarise general findings and highlight overall tendencies (Yang & Allison, 2003). Given these predictable rhetorical differences between sections, it is not surprising that previous studies have used them to examine the linkage between communicative purposes and their associated linguistic features. For example, Parkinson (2013) found that some verbs taking *that*-clauses such as *show*, *indicate*, *mean*, and *suggest* were particularly frequent in the Results section of social science RAs, and that survey participants were seldom the source of *that*-clauses outside of the Results section of RAs. One implication of Parkinson's study is that exploring *that*-clauses at the level of RA sections is likely to present a clear picture of specific variation in a local part of a text. Therefore, to contribute to a nuanced understanding of paradigmatic and disciplinary influence on *that*-clauses, the present study explores how the use of *that*-clauses varies in Introduction, Methods, Results, Discussion, and Conclusion sections of nursing and psychology RAs.

3. Corpora and methods

3.1. Corpora

This study focuses on empirical qualitative, quantitative, and mixed methods RAs in nursing and psychology, which were selected based on Biglan's (1973) disciplinary classification scheme. Based on Biglan's (1973) scheme, this study purposively selected nursing and psychology to represent the soft/life/applied group and the soft/life/pure group respectively, and there

are two reasons for such selection. First, both disciplines belong to the soft/life group where qualitative, quantitative, and mixed methods paradigms are likely to co-exist (Alise & Teddlie, 2010), and this can ensure that a sufficient number of RAs are included for the analysis of paradigmatic variation. Second, nursing and psychology have been chosen as representatives of the applied and pure groups in previous literature to validate disciplinary differences in the manners in which research is conducted (e.g., Alise & Teddlie, 2010). This provides a basis for comparing nursing and psychology and makes it reasonable to argue that there exists disciplinary variation in linguistic choices in these two disciplines.

Following Creswell (2014), an RA was classified as *qualitative* if it uses qualitative data such as observations or interviews to understand the meaning ascribed to a specific phenomenon, and *quantitative* if it uses numbers and collects statistically significant information to test hypotheses about relationships among variables. If an RA integrates both qualitative and quantitative methods in a single study, it was classified as a *mixed methods* article. The title, abstract, keywords, and methods section of an RA were examined to determine which research paradigm the text belongs to.

The corpora used for this study consist of 243 IMRDC-structured empirical nursing RAs and 243 IMRDC-structured empirical psychology RAs (eighty-one articles for each research paradigm in each discipline) published in high-ranking journals (see Table 2). The journals were determined based on the impact factors released by Thomson Reuters' Journal Citation Report (JCR) (Thomson Reuters, 2020), the gold standard for classifying journals (Giménez-Espert & Prado-Gascó, 2019). Three empirical nursing articles (one article for each research paradigm) were selected from each of the twenty-seven nursing journals belonging to JCR Quartile 1 in each year during the three years 2018-2020. For comparison, the same sampling method was used to collect psychology RAs. Each RA has independent Introduction, Methods, Results, Discussion, and Conclusion sections and the headings of these five sections are clearly labelled 'Introduction', 'Method(s)', 'Results', 'Discussion', and 'Conclusion', respectively. All RAs were converted to plain text files, and conversion errors were manually corrected. In-text author-date citations were retained, but tables, figures, footnotes, endnotes, appendices and references were removed.

Corpus		No. of texts	Words	Avg. text length
Nursing	Qualitative	81	341,904	4221.0
	Quantitative	81	314,788	3886.3
	Mixed methods	81	368,766	4552.7
	Subtotal	243	1,025,458	4220.0
Psychology	Qualitative	81	652,667	8057.6
	Quantitative	81	571,845	7059.8
	Mixed methods	81	615,973	7606.6
	Subtotal	243	1,840,485	7574.0
Total		486	2,865,943	5897.0

Table 2. Corpus composition (whole texts).

3.2. Text segmentation by section

To explore variation across sections, discourse annotation was added to enable the retrieval of quantitative data of different sections. The IMRDC sections and interview quotes were annotated using XML for sectional segmentation. Longer quotations that stand apart from the surrounding text were subtracted from the word count of each section to ensure more accurate quantitative data, while short quotations integrated into sentences were retained for sentence integrity. A Python script was then developed to segment each RA into five new files corresponding to the five sections (Introduction, Methods, Results, Discussion, and Conclusion) based on the XML mark-up. The composition of the corpora by section is shown in Table 3.

Corpus		No. of texts	Words	Avg. section length
Nursing	**Qualitative**			
	Introduction	81	55,799	688.9
	Methods	81	65,895	813.5
	Results	81	106,493	1314.7
	Discussion	81	103,429	1276.9
	Conclusion	81	10,288	127.1
	Quantitative			
	Introduction	81	63,642	785.7
	Methods	81	90,636	1119.0
	Results	81	50,702	626.0
	Discussion	81	100,386	1239.3
	Conclusion	81	9,422	116.3
	Mixed methods			
	Introduction	81	60,712	749.5
	Methods	81	94,361	1165.0
	Results	81	101,145	1248.7
	Discussion	81	103,009	1271.7
	Conclusion	81	9,539	117.8
Psychology	**Qualitative**			
	Introduction	81	172,223	2126.2
	Methods	81	131,350	1621.6
	Results	81	184,526	2278.1
	Discussion	81	139,806	1726.0
	Conclusion	81	24,762	305.7
	Quantitative			
	Introduction	81	170,627	2106.5
	Methods	81	155,658	1921.7
	Results	81	90,882	1122.0
	Discussion	81	131,018	1617.5
	Conclusion	81	23,660	292.1
	Mixed methods			
	Introduction	81	169,962	2098.3
	Methods	81	150,822	1862.0
	Results	81	132,816	1639.7
	Discussion	81	137,862	1702.0
	Conclusion	81	24,511	302.6

Table 3. Corpus composition by section.

3.3. Part-of-speech (POS) tagging and *that*-clauses classification

After segmenting, the texts were tagged for part-of-speech (POS) with *TagAnt* (Anthony, 2015), a software built on *TreeTagger* (Schmid, 1995). When the POS-tagging was completed, a Python script was developed to extract the complete paragraph where a sentence containing the tag *that*_IN/*that* (denoting *that* acts as a complementizer) was located. The extracted cases were examined and the cases where *that* acts as a demonstrative or relative pronoun were excluded from the data. For example, in the POS-tagged sentence *The_DT most_RBS common_JJ trajectory_NN is_VBZ* ***that_IN/that*** *of_IN leaders_NNS who_WP begin_VVP as_IN faculty_NN and_CC progress_NN to_TO department_NN chair_NN or_CC faculty_NN governance_NN roles_NNS ._SENT*, *that* actually acts as a demonstrative pronoun but it is mistakenly tagged as a complementizer. Therefore, this case was excluded from the data. To maximize recall, another Python script

was also developed to extract the paragraph where a sentence containing the tag *that*_DT (*that* acts as a demonstrative pronoun) or *that*_WDT (*that* acts as a relative pronoun) was located. The extracted cases were examined and the cases where *that* acts as a complementizer were retained. For example, in the two POS-tagged sentences *They_PP also_RB highlighted_VVD* ***that_DT*** *most_RBS online_JJ sources_NNS and_CC print_NN materials_NNS did_VVD not_RB cover_VV all_DT areas_NNS ._SENT* and *We_PP obtained_VVD further_JJR evidence_NN* ***that_WDT*** *co-produced_VVD services_NNS may_MD indeed_RB represent_VV a_DT cost-effective_JJ and_CC sustainable_JJ approach_NN for_IN the_DT future_NN of_IN public_JJ health_NN services_NNS ._SENT*, *that* actually acts as a complementizer but it is mistakenly tagged as a demonstrative or relative pronoun. Therefore, these cases were included in the data. Using a POS tagger system can help extract the cases of *that*-clauses more efficiently and accurately. However, one disadvantage of this methodology is that the cases of *that* omission cannot be identified, which will affect the accuracy of data analysis. To address this issue, this study carefully looked at all the texts to manually search for the cases of *that* omission (or zero *that*), which tend to be excluded in most previous studies (see e.g., Hyland & Tse, 2005a, 2005b; Kim & Crosthwaite, 2019). A total of 296 cases (nine cases per 10,000 words), 282 cases (eight cases per 10,000 words), and 65 cases (two cases per 10,000 words) of omission *that* were found in the qualitative, mixed methods, and quantitative nursing RAs in this study, and the corresponding figures in qualitative, mixed methods, and quantitative psychology RAs were 718 cases (eleven cases per 10,000 words), 554 cases (nine cases per 10,000 words), and 172 cases (three cases per 10,000 words). The data were then transferred to MAXQDA (MAXQDA Analytics Pro, 2021) to be coded based on the classification scheme adapted from Hyland and Tse (2005b). Each case was annotated with respect to the four variables of *evaluated entity*, *evaluative stance*, *evaluative source*, and *expression* (see Table 4 below). Two coders first performed the classification independently and the initial agreement rate was 89%. Each case of disagreement was then discussed to reach 100% agreement. One discrepancy was about the *evaluative source*. Initially, in cases where the items *results*, *study* and *findings* are preceded by the item *our* (e.g., *Our results show that* …), two sources (human, abstract entity) were coded. The two coders then negotiated to code cases of this sort as abstract entity because the authors have given their responsibility to the *results, study*, and *findings* and "these abstract entities seemed more prominent than the human(s) associated with them" (Parkinson, 2013, p. 205).

Hyland and Tse's (2005b) coding scheme, which was designed for RA abstracts, was adopted with minor adjustments. The modified scheme is shown in Table 4 and elucidated below.

Aspect	Subcategory
Evaluated entity	a. Evaluation of author's findings (e.g., Our study showed that *when faced with*...) b. Evaluation of previous studies (e.g., Previous studies suggest that *health professionals*...) c. Expression of author's goals (e.g., We hope that *these findings provide evidence*...) d. Evaluation of methods (e.g., A disadvantage of cluster analysis is that *totally different*...) e. Evaluation of models, theories, and hypotheses (e.g., The proposed model showed that *nurses' empathy*...) f. Evaluation of existing perceptions (e.g., Jordanian culture believes that *a man should work in*...) g. Evaluation of research ethics (e.g., Nurses were assured that *data would be kept confidential*...)
Evaluative stance	a. Attitudinal i. affect (e.g., It is *important* to note that...) ii. obligation (e.g., It *should* be noted that...) b. Epistemic i. certainty (e.g., The findings *show* that...) ii. doubt (e.g., Research *suggests* that...) iii. neutral (e.g., Nurses *reported* that...)
Evaluative source	a. Human i. Researchers (e.g., *We* argue that... / *Wright* claimed that...) ii. Research participants (e.g., *Participants* stated that...) b. Abstract entity (e.g., *Evidence* suggests that...) c. Concealed (e.g., *It* is known that...)
Expression	a. Non-verbal i. Noun predicate (e.g., The participants expressed the *fact* that...) ii. Adjective predicate (e.g., It is *evident* that...) b. Verbal predicate i. Research acts (e.g., The repeated measures *showed* that...) ii. Discourse acts (e.g., They *argue* that...) iii. Cognitive acts (e.g., They *perceive* that...)

Table 4. Classification scheme of *that*-clauses (adapted from Hyland & Tse, 2005b).

Evaluated entity. This category refers to the contents of *that*-clauses that writers choose to evaluate. As with Hyland and Tse (2005b), this study considers the evaluation of author's findings, of previous studies, of author's goals, and of methods, models, and theories. Three minor adjustments were made to the labels to accommodate the possible entities in the present study. First, following Parkinson (2013), the present study further divided Hyland and Tse's (2005b) broad label of "methods, models, theories" into two separate labels of "methods" and "models and theories", considering potentially different discussions of methods and of models and theories in in-text RA sections. This study added the evaluated entity of hypotheses, and merged this added entity into the subcategory of evaluation of models and theories to form the new label of evaluation of models, theories, and hypotheses. This practice was also adopted by Kim and Crosthwaite (2019). Second, this study added a label of existing perceptions to refer to what beliefs a culture or a society holds. Third, as nursing and psychology research involve human subjects, a label of research ethics was added to refer to

writers' ethical statements in research. It should be noted that in the cases where the subject in the super-ordinate clause is expressed as other researchers (e.g., *others)*, the evaluated entity is identified based on the super-ordinate clause rather than content of the *that*-clause, as in Kim and Crosthwaite (2019). For example, in the case *Others suggest that a minimum of 100 participants and extensive coding is needed to conduct the analysis* (Guest & McLellan, 2003), the present study coded the evaluated entity as evaluation of previous studies based on *others suggest* in the super-ordinate clause, even though the content of this *that*-clause is about methods.

Evaluative stance. This refers to writers' attitude towards the propositions in *that*-clauses. Hyland and Tse's (2005b) label of attitudinal stance was adopted to refer to the cases where writers signal affect (e.g., *it is* ***important*** *to note that*…) or obligation (e.g., *we* ***must recognize*** *that*…). Hyland and Tse's (2005b, p. 129) label of epistemic stance was adopted in this study to indicate "an assessment of the likely truth or accuracy of the proposition" via the expressions of certainty (e.g., *the findings* ***show*** *that*…), doubt (e.g., *our model* ***suggests*** *that*…) or neutrality (e.g., ***one point*** *is that*…).

Evaluative source. Following Hyland and Tse (2005b), this study considers whether writers attribute the source of evaluation to a human, an abstract entity, or a concealed source. The category human is further divided into a researcher (i.e., the author or other researchers) or a non-researcher (i.e., a research participant), following Kim and Crosthwaite (2019).

Evaluative expression. Writers can convey stance via a non-verbal group (i.e., nouns, adjectives) or verbal group (i.e., verbs). Like Hyland and Tse (2005b, p. 130), this study considers three verbal groups: research acts, which represent "experimental activities or actions carried out in the real world"; discourse acts, which focus on "the expression of cognitive or research activities"; and cognitive acts, which are concerned with "mental processes".

The raw frequencies of each category of the coded items for each file were counted and then converted into a normalised frequency per 1,000 words. The obtained data were then analysed using a series of between-groups analysis of variance (ANOVA) to explore paradigmatic (qualitative vs. quantitative vs. mix methods) and disciplinary (nursing vs. psychology) influences. When a statistically significant effect of research paradigm was found, post hoc tests with the Bonferroni correction were run to make pairwise comparisons between the three research paradigms. To correct for multiple testing, p values less than 0.0125 (for four tests of *evaluated entity*,

evaluative stance, *evaluative source*, and *expression*) were considered statistically significant under the Bonferroni adjustment (Dinno, 2015). The null hypothesis is that there is no association between research paradigm/discipline and the use of *that*-clauses.

4. Results and discussion

4.1. Evaluated entity

Tables 5a and 5b show the descriptive statistics and ANOVA results for the evaluated entities in *that*-clauses by section in each discipline and each paradigm. Due to the limited space, Tables 5a and 5b only list the descriptive statistics and ANOVA results for the evaluated entities that were found to have statistically significant paradigmatic or disciplinary differences. This practice also applies to Tables 6a-8b below.

			Qualitative		Quantitative		Mixed	
			M	SD	M	SD	M	SD
Author's findings	Results	Nursing	11.76	6.25	3.45	3.38	9.03	5.56
		Psychology	11.61	6.29	3.51	3.41	8.87	5.48
Existing perceptions	Introduction	Nursing	1.14	1.51	0.25	0.52	0.29	0.79
		Psychology	1.06	1.41	0.24	0.51	0.28	0.72
Research ethics	Methods	Nursing	1.53	1.42	0.56	0.43	1.46	1.52
		Psychology	1.49	1.39	0.03	0.15	1.45	1.38

Table 5a. Descriptive statistics for evaluated entities in *that*-clauses by section in each discipline and each paradigm.

		Paradigmatic comparison		Disciplinary comparison		Interaction	
		F-value	*p*-value	*F*-value	*p*-value	*F*-value	*p*-value
Author's findings	Results	104.218	**<.001**	0.035	.851	0.024	.976
Existing perceptions	Introduction	38.430	**<.001**	0.121	.728	0.062	.940
Research ethics	Methods	42.563	**<.001**	0.368	.542	32.598	**<.001**

Table 5b. ANOVA tests for evaluated entities in *that*-clauses by section in each discipline and each paradigm.

As shown in Table 5b, the ANOVA test showed a significant effect of paradigm on *author's findings* in the Results section. Post hoc comparisons revealed that both qualitative and mixed methods RAs more frequently evaluated *author's findings* via *that*-clauses than quantitative RAs in the Results section. The examination of concordances reveals that compared to quantitative researchers, qualitative and mixed methods researchers were

more likely to report their research findings in the form of participants' opinions via *that*-clauses in the Results section of RAs (1).

(1) The nurses ***described that*** they used the system and found it to be efficient for the exchange of information in relation to patients in need of transitional care. [Nursing_Quali_Discussion_33]

The tendency to report what participants say could be explained by the constructivist epistemology that dominates qualitative research. Constructivist epistemology assumes the existence of socially constructed realities of which people construct their own understandings (Yilmaz, 2013). Constructivist epistemology underlies typical qualitative research methods like semi-structured research interviews, which are prominent in the corpus data of the present study, and studies relying on interviews are expected to report in detail how they arrive at contextualised understandings of the participants' views. Mixed-methods studies also rely heavily on semi-structured interviews, which is likely to account for the high frequency of *that*-clauses in this section of the corpus.

As shown in Table 5b, the ANOVA test showed a significant effect of paradigm on *existing perceptions* in the Introduction section. For post hoc comparisons, qualitative RAs more frequently evaluated *existing perceptions* via *that*-clauses than both quantitative and mixed methods RAs in the Introduction section. Qualitative researchers typically evaluate via *that*-clauses what beliefs cultural groups tend to hold (2) and what common perceptions health organizations are likely to advocate (3).

(2) Jordanian culture ***believes that*** a man should work in a "tough" job. [Nursing_Quali_Introduction_04]

(3) It is well ***established that*** breastfeeding has substantial benefits for the health of the infant and mother (World Health Organization, 2011). [Nursing_Quali_Introduction_08]

Qualitative researchers' greater tendency to evaluate *existing perceptions* than quantitative and mixed methods researchers in Introduction might be related to the constructivist epistemology, which assumes that knowledge is context-dependent and is socially constructed based on worldviews or value systems in cultural groups (Yilmaz, 2013). Such emphasis on contextualised understandings may motivate qualitative researchers to evaluate existing perceptions when establishing the niche for their study at the beginning of their texts.

As shown in Table 5b, the ANOVA test showed a significant effect of paradigm on *research ethics* in the Methods section. Post hoc comparisons revealed that both qualitative and mixed methods RAs more frequently evaluated *research ethics* via *that*-clauses than quantitative RAs in the Methods section. Qualitative and mixed methods researchers use *that*-clauses when informing participants of the right to withdraw (4) and guaranteeing them the confidentiality of information (5).

(4) The participants were ***informed that*** they had the right to withdraw from the study at any time. [Nursing_Quali_Methods_50]

(5) Participants were ***assured that*** data would be kept confidential. [Nursing_Mixed_Methods_23]

This finding may appear surprising at first, given that one might reasonably expect that acknowledging and adhering to research ethics is important in all research, regardless of research paradigms. One potential explanation is that the qualitative and mixed methods research in the data of the present study, which involve face-to-face interactions and include collecting direct personal data in the form of participants' voices (along with potential other direct or indirect identifiers), should protect participants by "taking extra care in preserving confidentiality, anonymity, safety, and the right to withdraw from the research at any time" (Kostas-Polston & Hayden, 2006, p. 307). By contrast, the quantitative research in the data of the present study mainly rely on structured questionnaires with a set of standardized questions, which may not involve many face-to-face interactions and the personal information given by participants may not be as much as that in qualitative and mixed methods research.

Furthermore, as shown in Table 5b, for the evaluated entity of *research ethics*, no significant effect of discipline was found in the Methods section. However, there was a significant interaction between paradigm and discipline in the Methods section. The interaction occurred because while quantitative RAs showed disciplinary difference, there was no disciplinary variation in qualitative and mixed methods RAs between the two disciplines.

The qualitative and mixed methods RAs in nursing and psychology both involve face-to-face interactions and emphasise research ethics, thus showing no disciplinary variation. However, in terms of the research ethics in quantitative nursing and psychological research, the strictness may differ depending on specific research issues. Psychological research using

structured questionnaires to investigate some issues such as the activities conducted in an educational setting for training purposes can be exempt from full review by the Institutional Review Board (Goodwin & Goodwin, 2016). By contrast, nursing research, which is likely to include vulnerable subjects such as pregnant women and physically or mentally disabled persons as questionnaire participants, is required to adhere to ethical principles throughout the research process even when structured questionnaires do not involve face-to-face interactions (Doody & Noonan, 2016). Such difference in ethical standards may explain the occurrence of disciplinary difference only in quantitative RAs.

4.2. Evaluative stance

Tables 6a and 6b show the descriptive statistics and ANOVA results for the stance signalled via *that*-clauses by section in each discipline and each paradigm. As shown in Table 6b, the ANOVA test showed a significant effect of paradigm on the attitudinal stance of affect in the Results section. Post hoc comparisons revealed that both qualitative and mixed methods RAs contained higher frequencies of *that*-clauses conveying affect than quantitative RAs in the Results section.

			Qualitative		Quantitative		Mixed	
			M	SD	M	M	SD	M
Affect	Results	Nursing	1.07	1.35	0.07	0.33	0.84	1.40
		Psychology	1.09	1.28	0.06	0.30	0.88	1.38
Certainty	Discussion	Nursing	3.42	2.44	3.62	2.41	3.20	2.65
		Psychology	1.34	1.27	1.20	1.12	1.02	1.09
Doubt	Discussion	Nursing	2.65	1.64	4.53	2.57	2.78	1.98
		Psychology	2.68	1.71	4.50	2.48	2.80	1.91
Neutral	Results	Nursing	6.66	4.26	0.26	0.72	5.06	4.23
		Psychology	6.65	4.26	0.26	0.71	5.04	4.23

Table 6a. Descriptive statistics for stance signalled via *that*-clauses by section in each discipline and each paradigm.

		Paradigmatic comparison		Disciplinary comparison		Interaction	
		F-value	*p*-value	*F*-value	*F*-value	*p*-value	*F*-value
Affect	Results	36.704	**<.001**	0.036	.849	0.017	.983
Certainty	Discussion	1.177	.309	158.416	**<.001**	0.320	.726
Doubt	Discussion	39.966	**<.001**	0.001	.970	0.010	.990
Neutral	Results	147.028	**<.001**	0.001	.970	0.000	1.000

Table 6b. ANOVA tests for stance signalled via *that*-clauses by section in each discipline and each paradigm.

Qualitative and mixed methods researchers mainly use *that*-clauses in the Results section to describe participants' emotional reactions (6). Interestingly, the results of this study thus do not support Hu and Cao's (2015) observation of frequent attitude markers in quantitative RAs. This discrepancy may be ascribed to the fact that other forms of attitude markers such as evaluative adverbs were preferred in my data of quantitative RAs (7). Furthermore, the present study and Hu and Cao (2015) focus on different disciplines, which may also be a potential factor that leads to the difference in research findings. However, more research is needed to prove whether such a speculation is right.

(6) Many nursing leaders in academia expressed the ***frustration that*** they cannot complete their research agendas. [Nursing_Quali_Results_46]

(7) Only approximately half (49.5%) of the student cohort […], which was ***surprisingly low***. [Nursing_Quan_Results_20]

As shown in Table 6b, for the epistemic stance of certainty, the ANOVA test showed a significant effect of discipline in the Discussion section, with nursing RAs containing a higher frequency of *that*-clauses conveying certainty than psychology RAs. Examination of concordances reveals that nursing researchers tend to convey certain stance with first-person pronouns via *that*-clauses to assert writers' authority and convince readers of their arguments (8). By contrast, this practice was less frequently adopted by psychology researchers, which may be related to the heavier dependence on empirical authority than on personal authority in the discipline of psychology (Hu & Cao, 2015). It means that there is a less need for psychology researchers to use certain stance to make knowledge claims with strong authorial intervention.

(8) We have ***shown that*** this will be appealing to those considering implementing similar schemes elsewhere. [Nursing_Quali_Discussion _76]

As shown in Table 6b, regarding the epistemic stance of doubt, the ANOVA test showed a significant effect of paradigm in the Discussion section. Post hoc comparisons revealed that quantitative RAs containing a higher frequency of *that*-clauses conveying doubt in Discussion than qualitative and mixed methods RAs. Quantitative researchers tend to use these semantically weak reporting words when pointing out the potential limitations that may affect research findings (9).

(9) There is always a risk of response bias when using self-reported survey data, and it is ***possible that*** students reported data that was not truly reflective of the measured variables. [Nursing_Quan_Discussion_31]

This could be explained by the positivist epistemology that underpins quantitative research. The nature of valuing general laws of causality in positivist epistemology requires quantitative researchers to make inferences from statistical data. Such inferences are likely to make quantitative researchers reflect on the potential methodological limitations such as a limited sample size that may influence the accuracy of uncovering cause-effect relationships (Cao & Hu, 2014).

As shown in Table 6b, for the neutral stance, the ANOVA test showed a significant effect of paradigm in the Results section. Post hoc comparisons revealed that qualitative and mixed methods RAs contained higher frequencies of *that*-clauses conveying neutral stance in Results than quantitative RAs. Qualitative and mixed methods researchers typically signal neutral stance via *that*-clauses when reporting participants' voices in direct quotations (10).

(10) The interviewees ***stated that*** "It's a health education issue" (E07). [Nursing_Quali_Results_62]

This may be related to the requirement that qualitative and mixed methods researchers are expected to provide readers with quotations from participants (Yilmaz, 2013). When directly conveying participants' words to readers, an impartial stance may be needed.

4.3. Evaluative source

Tables 7a and 7b show the descriptive statistics and ANOVA results for the evaluative source in *that*-clauses by section in each discipline and each paradigm. As shown in Table 7b, the ANOVA test showed a significant effect of paradigm on human sources in the Results section. Post hoc comparisons revealed that both qualitative and mixed methods researchers more frequently attributed their evaluations to humans via *that*-clauses in Results than quantitative researchers.

			Qualitative		Quantitative		Mixed	
			M	SD	M	M	SD	M
Human	Results	Nursing	8.95	5.25	0.42	1.11	6.60	4.92
		Psychology	8.84	5.16	0.42	1.08	6.62	5.08
	Discussion	Nursing	3.43	2.50	2.76	2.27	2.79	2.35
		Psychology	6.50	2.40	5.83	2.24	5.67	2.26

Table 7a. Descriptive statistics for evaluative source in *that*-clauses by section in each discipline and each paradigm.

		Paradigmatic comparison		Disciplinary comparison		Interaction	
		F-value	*p*-value	*F*-value	*F*-value	*p*-value	*F*-value
Human	Results	175.507	**<.001**	0.007	.936	0.010	.990
	Discussion	1.135	.312	200.910	**<.001**	0.096	.909

Table 7b. ANOVA tests for evaluative source in *that*-clauses by section in each discipline and each paradigm.

Examination of concordances reveals that qualitative and mixed methods researchers typically present participants' opinions via the voice of research participants, referring to a specific participant (11), a group of participants (12), or using the general terms such as *participants* (13).

(11) ***The 43-year-old man with BS explained that*** to cope with the device inside him, he worked on sharpening his senses. [Nursing_Quali_Results_39]

(12) ***The clinical nurses in the Estonian focus group confirmed that*** they did have choice in the shifts. [Nursing_Quali_Results_73]

(13) ***Participants reported that*** patient care was impeded by withholding information. [Nursing_Quali_Results_60]

Such a preference for human sources may be related to the fact that qualitative and mixed methods research rely on research participants' words as data source of research findings. As compared to qualitative and mixed methods researchers, quantitative researchers were less likely to attribute their evaluations to research participants because quantitative research mainly use structured questionnaires with pre-determined response categories into which participants' experiences are expected to fit and transform participants' behaviour into numerical data.

Besides, as shown in Table 7b, the ANOVA test also showed a significant effect of discipline on human sources in the Discussion section, with psychology researchers more frequently attributing their evaluations to humans via *that*-clauses in Discussion than nursing researchers. Examination

of concordances reveals that psychology researchers tend to attribute their evaluations to exclusive *we* in the Discussion section (14). This may be related to the impact of the American Psychological Association's (APA) Publication Manual, which recommends the use of first-person pronouns and exerts an important standardizing influence on the language of psychology (Hu & Cao, 2015).

(14) ***We speculate that*** in the high-load condition children would face difficulties in managing the competing visual information provided by the two sources of stimulation. [Psychology_Quan_Discussion_65]

4.4. Evaluative expression

Tables 8a and 8b show the descriptive statistics and ANOVA results for the evaluative expression in *that*-clauses by section in each discipline and each paradigm. As shown in Table 8b, the ANOVA test showed a significant effect of paradigm on noun expressions in the Results section. Post hoc comparisons revealed that both qualitative and mixed methods RAs contained higher frequencies of nouns taking *that*-clauses than quantitative RAs in Results. As previously mentioned for evaluative stance, qualitative and mixed methods researchers mainly use these noun expressions taking *that*-clauses to describe participants' emotional reactions (see example 6 above).

			Qualitative		Quantitative		Mixed	
			M	SD	M	M	SD	M
Noun	Results	Nursing	1.09	1.47	0.09	0.39	0.73	1.07
		Psychology	1.10	1.51	0.09	0.37	0.79	1.18
Cognitive acts	Results	Nursing	4.45	3.75	0.20	0.67	3.69	3.53
		Psychology	4.42	3.81	0.19	0.62	3.70	3.38

Table 8a. Descriptive statistics for evaluative expression in *that*-clauses by section in each discipline and each paradigm.

		Paradigmatic comparison		Disciplinary comparison		Interaction	
		F-value	*p*-value	*F*-value	*F*-value	*p*-value	*F*-value
Noun	Results	34.965	**<.001**	0.051	.821	0.035	.966
Cognitive acts	Results	93.441	**<.001**	0.002	.968	0.002	.998

Table 8b. ANOVA tests for evaluative expression in *that*-clauses by section in each discipline and each paradigm.

As shown in Table 8b, for cognitive verbs, the ANOVA test showed a significant effect of paradigm in the Results section. Post hoc comparisons revealed that both qualitative and mixed methods RAs contained higher frequencies of cognitive verbs taking *that*-clauses than quantitative RAs in Results. This is because qualitative and mixed methods RAs use semi-structured interviews to gather data, giving rise to the use of cognitive verbs to describe the mental processes and perceptions that participants express in interviews (15).

(15) Parents ***felt that*** they would feel more supported if professionals assessed the arguments for their final decision. [Nursing_Quali_Results_09]

5. Conclusion

This study has extended the previous studies of *that*-clauses by controlling for the variable of research paradigm in different disciplines to explore paradigmatic and disciplinary variation. Based on the data from two disciplines of nursing and psychology, this study finds variation in the use of *that*-clauses across qualitative, quantitative, and mixed methods RAs, which further shows that paradigmatic variation is an important factor that should be taken into account.

This study may have methodological implications for cross-disciplinary investigations of *that*-clauses. For example, a previous cross-disciplinary comparison of business studies and medicine by Kim and Crosthwaite (2019) has suggested that the use of all the four elements of *that*-clauses (evaluated entity, evaluative stance, evaluative source, expression) is linked to disciplinary norms. However, controlling for the variable of research paradigm enables the present study to determine whether the observed variation in the use of *that*-clauses is related to disciplinary norms, paradigmatic influence, or both. The paradigmatic variation in the four elements of *that*-clauses found in the present study, therefore, calls into question the reliability of previous cross-disciplinary research design, as the factor of research paradigm is not considered and unbalanced data make it unable to determine whether the more frequent use in one discipline than the other is related to disciplinary conventions, paradigmatic influence, or both. The importance of considering the factor of research paradigm in cross-disciplinary studies has also been highlighted in Yang (2023), who

controls for the variable of research paradigm and obtains different results of a linguistic feature (i.e., lexical bundles) compared to those studies where the variable of research paradigm has not been controlled.

The findings of the present study may also have methodological implications for studies tracking diachronic changes in *that*-clauses. Hyland and Jiang (2018) tracked diachronic changes in *that*-clauses from 1965 to 2015 based on published RAs from four disciplines of applied linguistics, biology, engineering, and sociology. They found a decline in neutral stance in published writing over these 50 years and explained the decline in terms of changing rhetorical practices in academic writing. However, the more frequent use of neutral stance in qualitative and mixed methods RAs than quantitative RAs found in the present study may make us rethink Hyland and Jiang's (2018) finding of neutral stance, as the decline in this category may also be related to uneven distribution of qualitative, quantitative, and mixed methods RAs in the corpora designed for different periods. The present study, therefore, recommends that the variable of research paradigm be considered in studies exploring disciplinary variation or tracking diachronic changes in linguistic features to obtain more accurate results.

Alongside the implications for cross-disciplinary and diachronic investigations, the present study also has methodological implications for studies exploring intra-textual variation. This study locates where paradigmatic variation in *that*-clauses occurs by dividing whole texts into five sections of Introduction, Methods, Results, Discussion, and Conclusion. This practice of dividing whole texts into sections can be applied in future studies to obtain a nuanced understanding of intra-textual variation.

A final methodological implication of this study is related to the cases of *that* omission in academic writing. In this study, the cases of omission *that* are found to be more frequent in qualitative and mixed methods RAs, indicating the importance of considering *that* omission for a more accurate analysis in a corpus where a large number of qualitative and mixed methods RAs are included.

To sum up, the above-mentioned methodological implications are concerned with how to help corpus linguists optimize research design and obtain more accurate results in corpus studies of linguistic features. Corpus analysis in the studies exploring disciplinary variation or tracking diachronic changes is adopted as an evidential tool to validate assumptions made about linguistic features. Ignoring the potential influence of research paradigm in corpus

studies would run the risk of not accurately explaining the observed linguistic variation. The evidence from the present study thus endorses the notion of controlling for the variable of research paradigm in corpus studies of linguistic features to reach more accurate results.

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