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Journal of Medical Ethics at 50. A data-driven history

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Abstract. In this paper, we take a data-driven approach to analyse intellectual trends over the first five decades of the *Journal of Medical Ethics* (*JME*). Our dataset, comprising all texts published in the *JME* since 1975, reveals not only the most distinctive topics of the *JME* in comparison to other key journals with similar profiles but also diachronic fluctuations in the prominence of certain topics. Overall, the distribution of topics shifted gradually, with each editorial period at the *JME* showing continuity with its immediate predecessor. However, a significant drift in topic distribution is evident over the fifty years, with some editorial periods being more "disruptive" than others. These disruptions were influenced by external events (e.g., *Public health emergencies*), broader trends in bioethics (e.g., the recent growth of topics such as *Race*, *Privacy*, and *Vaccination*), or editors' preferences (e.g., *Ethics education*). Additionally, our data provides insights into editorials where editors outlined their visions for the journal or reflected retrospectively on their past editorship.

In 2025, the *Journal of Medical Ethics* (*JME*) turns fifty. (For a detailed account of prehistory and early days of *JME*, see materials in Reynolds & Tansey.[1]) In this paper, we retrospectively look at the work published in this journal over the past five decades. In an exploratory spirit, we conduct analyses based on full-text data from 5,957 texts published in *JME* from 1975 till mid-2024 (see **Fig 1**; for inclusion criteria, see Bystranowski et al.[2]). After describing our data, we start with a general overview of the topical structure of *JME* using the topic model reported in Bystranowski et al..[2] (For other applications of this topic model, see Bystranowski et al.[3] and Żuradzki T., Bystranowski P., Dranseika V. *Discussions on Human Enhancement Meet Science: A Quantitative Analysis* (unpublished manuscript).) Then, we compare *JME* to other key journals in bioethics and philosophy of medicine.

Finally, we analyse how topics covered in JME change over time and under different editors-in-chief.

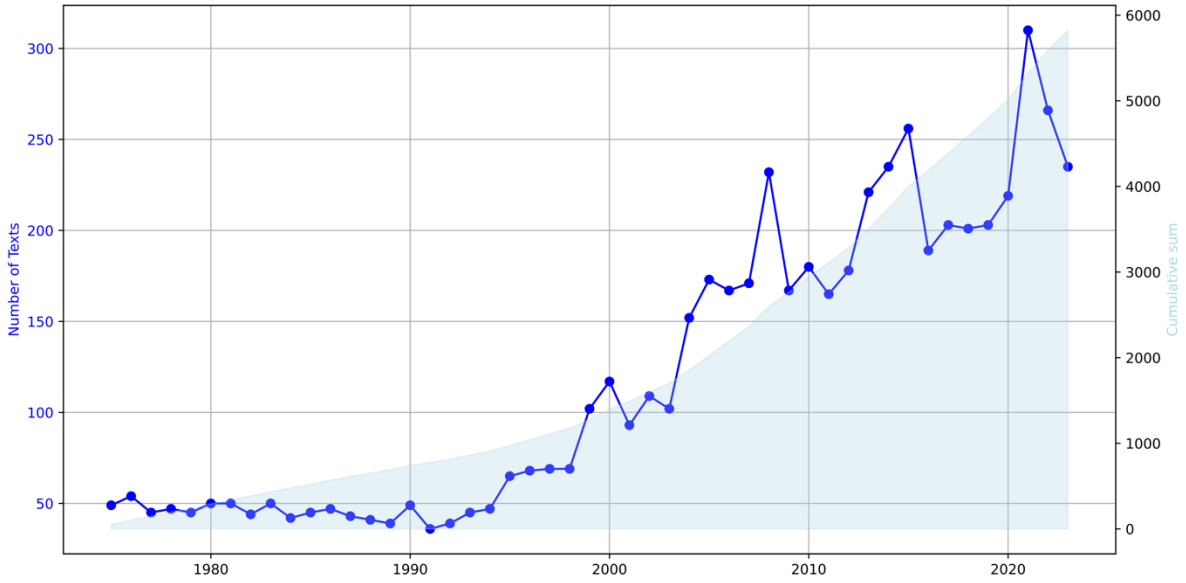

Figure 1. Number of texts published in *JME* per year (dark blue) and cumulative sum of texts published in *JME* (light blue).

TOPIC MODEL

Our primary data source is the output of a topic model described in Bystranowski et al..[2] This model was trained on a full-text corpus of 19,488 texts published from 1971 till early 2021 in seven leading journals in bioethics and philosophy of medicine and resulted in 97 interpreted topics. *JME* was one of the journals included in the study.[i] [ii] While we refer the reader to Bystranowski et al.[2] for complete details on journal selection, data processing, model training, and topic interpretation, here we briefly introduce some technical terminology that we use in the rest of this article.

Topic modelling is a computational method used to uncover abstract themes (topics) from a large collection of texts by identifying word co-occurrence patterns. Standard topic models, such as ones produced by the latent Dirichlet allocation algorithm,[4] provide output in the form of two families of probability distributions: *topics*, that is, probability distributions over vocabulary, and *documents*, that is, probability distributions over topics. In this sense, each individual text present in the corpus is modelled as a *document*. While a text is an ordered set of words, its corresponding *document* is a vector – a probability distribution over topics. As each topic assigns large probabilities to just a few keywords, topics are typically easy to *interpret*, that is, to map onto discrete themes present in the analysed corpus. We

[i] 5,052 *JME* articles available in April 2021 were part of the data set used to train the model. 867 *JME* articles published between April 2021 and July 2024, added to the current data set, were thus not used to train the model, but rather the trained model was used to extract topic vectors from them. Similarly, 38 articles published in 1976, not included in the original data set due to a *JME* database issue, were added to the current analysis.

[ii] The other six journals are *Bioethics* (*BIOETHICS*), *The American Journal of Bioethics* (*AJOB*); *Medicine, Health Care and Philosophy* (*MHCP*); *Hastings Center Report* (*HCR*); *The Journal of Medicine and Philosophy* (*JMP*); and *Theoretical Medicine and Bioethics* (*TMB*).

interpreted our topics by assigning *short labels* and more informative *long labels* to each topic. Short labels, long labels, and 10 key words for each topic can be found in Appendix A to Bystranowski et al..[2] We divided interpreted topics into two classes: substantive areas of research (*content topics*), such as *IVF and surrogacy* or *Ethics education*, and methodological or genre-specific categories (*framing topics*[5]), such as *Quantitative empirical bioethics* or *Clinical stories*. In the model, we interpreted 91 content and 6 framing topics. As content topics tend to systematically co-occur across documents, we were able to uncover eight more coarse-grained topic clusters, such as BEGINNING OF LIFE or PATIENTS AND RESEARCH PARTICIPANTS. Finally, as each text is represented by a vector of topic probabilities, such vectors can be averaged across, say, texts published in a given year or a given journal, allowing us to show how *prominent* different topics were in that year or in that journal.

NON-DIACHRONIC ANALYSES

In this section, we describe several non-diachronic analyses, i.e., analyses based on full-text data without considering publication year or editorial period.

Overall topical constitution of *JME*

The prominence of individual content topics (grouped by topic cluster) in *JME* is displayed in **Fig 2** (for interpretation of topics/clusters, see Bystranowski et al.[2]). The most pronounced topic (3.3%) is *Confidentiality* (Long name: *Medical confidentiality*; top terms: *doctor confidentiality professional dr practitioner relationship profession hospital duty tell*). This topic is followed by *Education* (*Ethics education*; top terms: *student education school teach program learn training teaching skill professional*; 1.8%) and *Law: international* (*International and comparative law*; top terms: *law country legal european article committee guideline german international declaration*; 1.7%).

For framing topics,[5] their prominence in *JME* is displayed in **Fig 3** (for interpretation of framing topics, see Bystranowski et al.[2]), with language associated with moral philosophy (*Moral philosophy discourse*; top terms: *objection morally relevant non kind justify account thing position conclusion*; 4.0%) and quantitative research (*Quantitative empirical bioethics*; top terms: *respondent survey table response report questionnaire difference attitude datum participant*; 3.4%) being especially prominent.

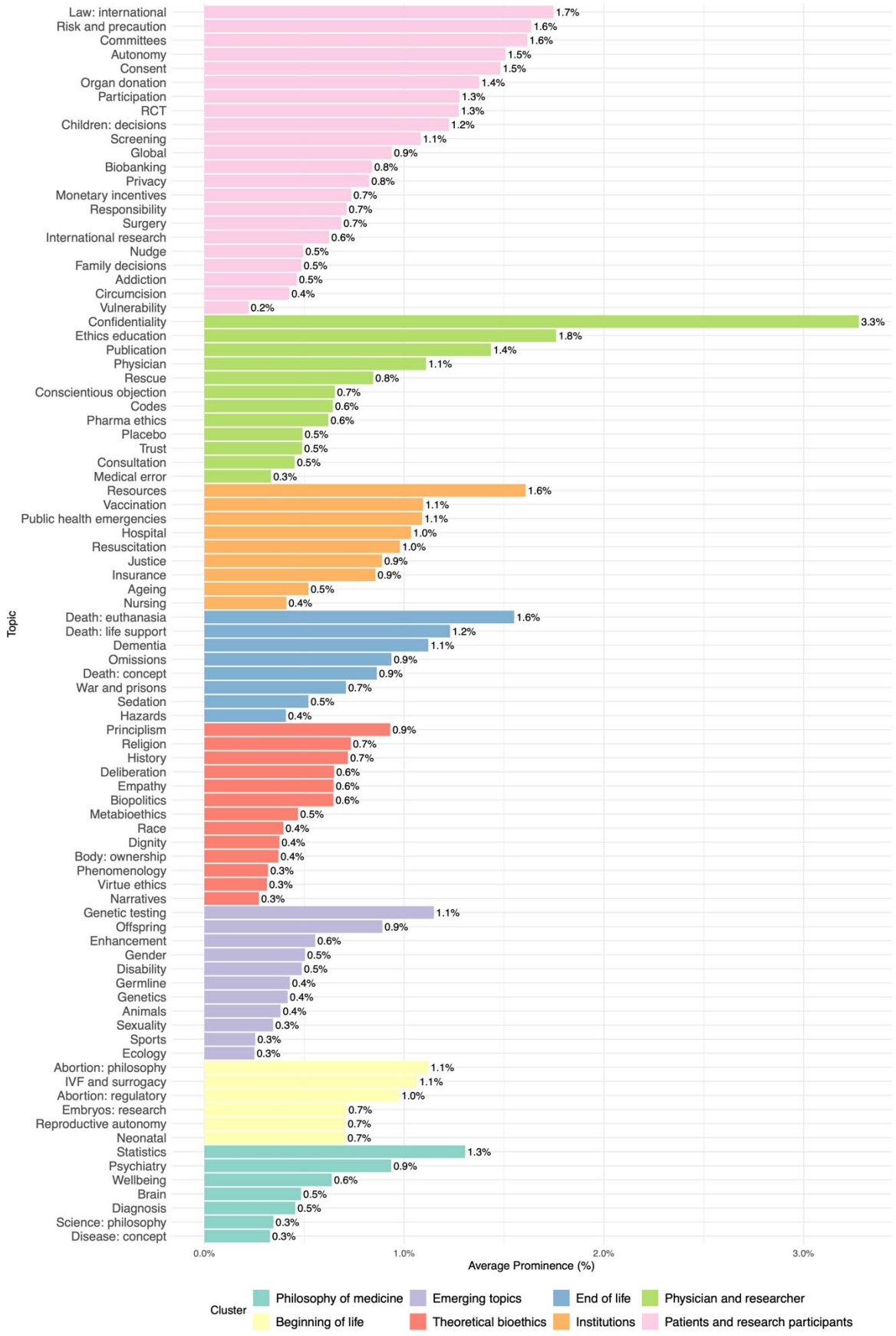

Figure 2. The prominence of individual content topics in *JME*. Topics are grouped by topic cluster.

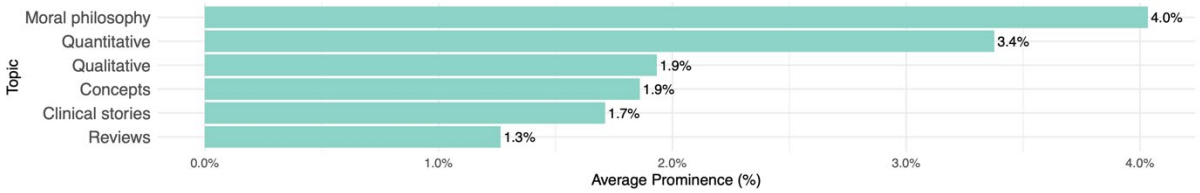

Figure 3. The prominence of individual framing topics in *JME*.

Comparison to other journals in bioethics and philosophy of medicine

To compare *JME* to other key journals in the field of bioethics and philosophy of medicine, we calculated cosine similarities between topic vectors[iii] in the seven journals (see **Fig 4a**). Cosine similarity, equal to the cosine of the angle between two vectors, is the most common similarity measure in natural language processing.[iv] The higher the cosine similarity between the two topic vectors representing two journals, the more similar these journals are in terms of the distribution of topics they cover. The journal with the highest topic similarity to *JME* is *BIOETHICS* (S_C = .82), followed by *MHCP* (S_C = .67) and *AJOB* (S_C = .65). Assuming that this similarity metric allows grouping analyzed journals into discrete clusters, we used hierarchical clustering with cosine distance (D_C = 1 - S_C) and Ward's method (Ward.D2), implemented in the R function *hclust*, to identify distinct clusters of journals (see **Fig 4b**).[6] Such a procedure resulted in a cluster more distinctly focused on philosophy of medicine (*MHCP*, *JMP*, *TMB*) and that more distinctly focused on bioethics. The bioethics cluster is further divided into two sub-clusters, one covering *AJOB* and *HCR*, the other – *JME* and *BIOETHICS*.

Fig 5 provides some insight into the nature of the division between the two groups of journals. In one group of journals (*TMB*, *MHCP*, *JMP*), topic clusters PHILOSOPHY OF MEDICINE and THEORETICAL BIOETHICS are relatively more pronounced. In the other one (*JME*, *BIOETHICS*, *HCR*, *AJOB*), clusters PATIENTS AND RESEARCH PARTICIPANTS, PHYSICIAN AND RESEARCHER, BEGINNING OF LIFE, and EMERGING TOPICS are relatively more pronounced.[v]

[iii] A topic vector for a given journal is an average of all document-vectors representing texts published in the journal.

[iv] On cosine similarity in natural language processing, see section 6.4 in Daniel Jurafsky and James H. Martin. 2024. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition with Language Models, 3rd edition*. Online manuscript released August 20, 2024. https://web.stanford.edu/~jurafsky/slp3

[v] It is worth stressing in advance, however, that while PATIENTS AND RESEARCH PARTICIPANTS and PHYSICIAN AND RESEARCHER are the most pronounced topic clusters in *JME*, they exhibit a striking pattern of reversal of their relative prominence over time, see **Fig 7a**.

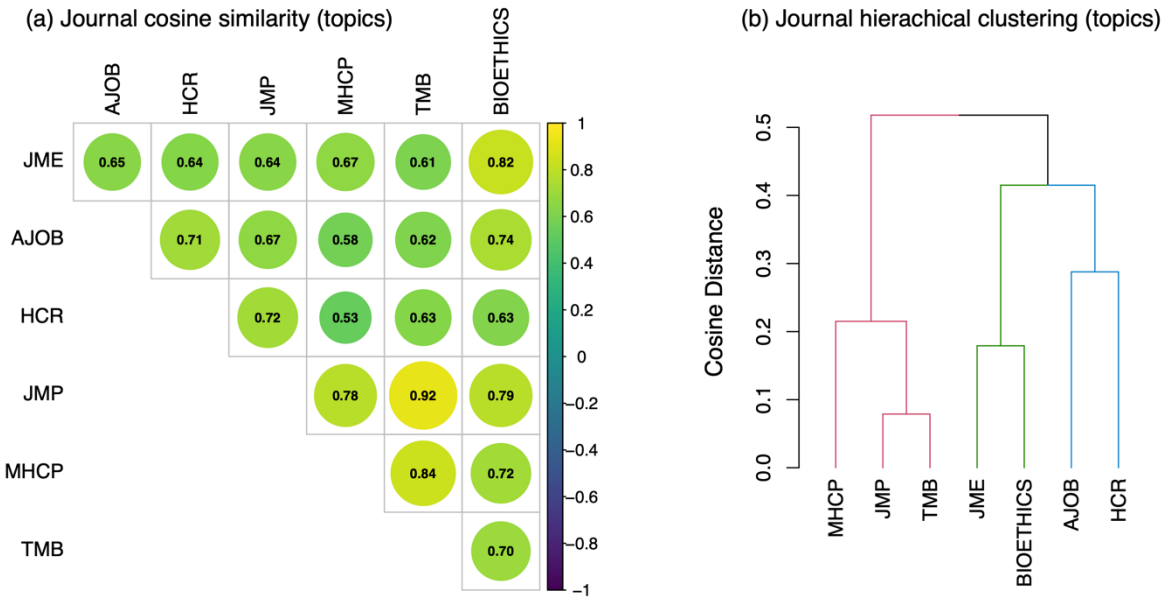

Figure 4. Journal cosine similarity (S_C) based on topic distribution (a) and hierarchical clustering dendrogram of journals based on cosine distance (1 - S_C).

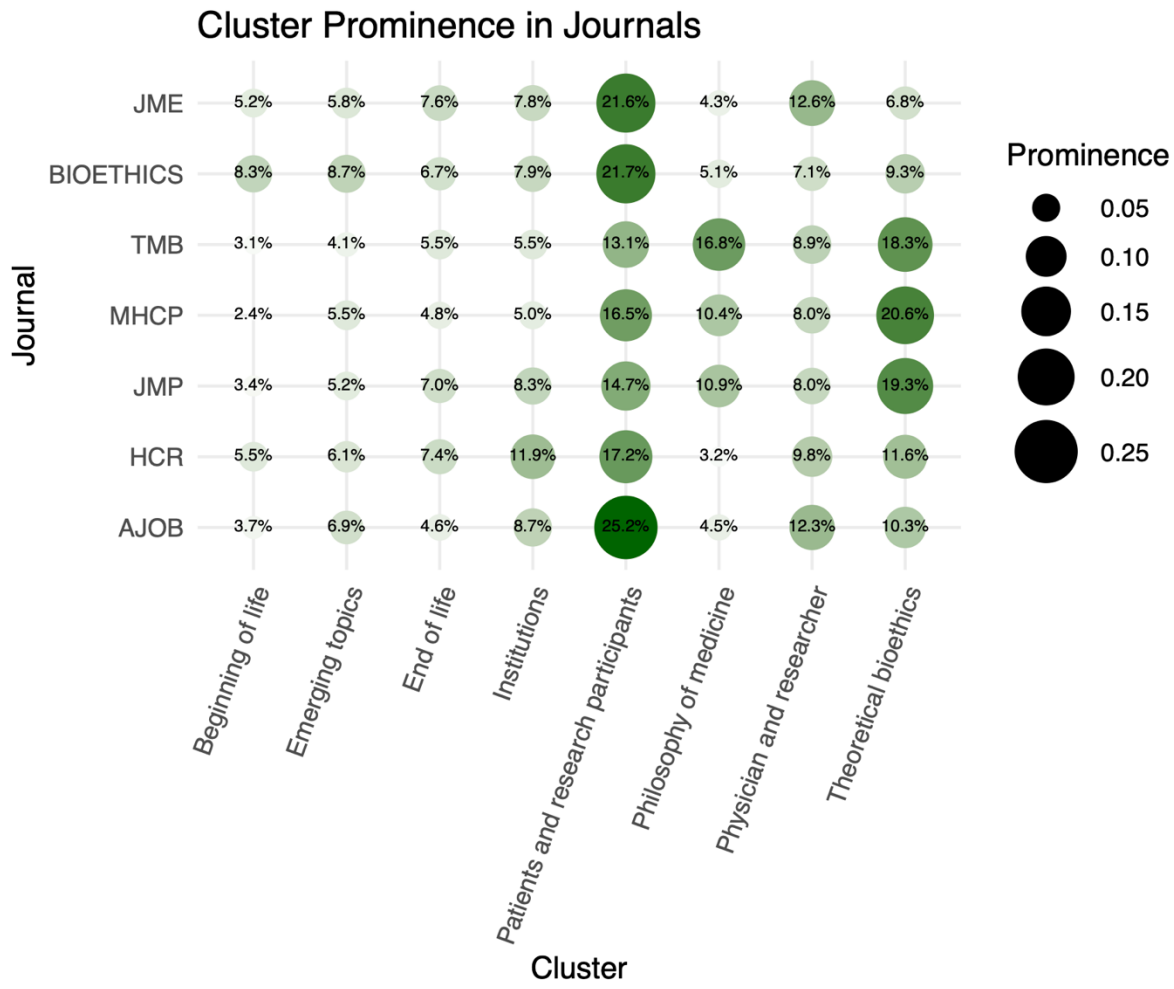

Figure 5. The prominence of content-based clusters in individual journals.

Most (un)characteristic topics

Which topics are the most (un)characteristic of *JME*? To do this, we compare the prominence of a given topic in *JME* to the average prominence of this topic in (a) a set of other six key journals in bioethics and philosophy of medicine, and in (b) *BIOETHICS* - the journal that is the most similar in its topical profile to *JME*. Most characteristic content topics are listed in **Table 1**, and the most uncharacteristic content topics are listed in **Table 2**.

Table 1. Most characteristic content topics. Long labels in the brackets.

(a) Compared to all six journals		(b) Compared to *BIOETHICS*	
Topic	Ratio	Topic	Ratio
Confidentiality (*Medical confidentiality*)	6.0 : 1	Education (*Ethics education*)	7.0 : 1
Education (*Ethics education*)	2.2 : 1	Confidentiality (*Medical confidentiality*)	5.0 : 1
Circumcision (*Circumcision and genital mutilation*)	2.1 : 1	Medical error (*Medical error and professionalism*)	3.9 : 1
Publication (*Publication ethics*)	1.9 : 1	Resuscitation (*Resuscitation*)	2.4 : 1
Consent (*Consent*)	1.8 : 1	Hospital (*Patient - hospital relations*)	2.2 : 1
Death: life support (*Withholding / Withdrawal of life support*)	1.8 : 1	History (*Historical topics in medicine and philosophy of medicine*)	2.1 : 1
Death: euthanasia (*Euthanasia and physician-assisted suicide*)	1.8 : 1	Screening (*Cancer screening and overdiagnosis*)	1.9 : 1
Resources (*Resource allocation*)	1.7 : 1	Hazards (*Risks and occupational hazards*)	1.8 : 1
Biobanking (*Biobanking*)	1.7 : 1	Law: health (*Health law*)	1.8 : 1
Sexuality (*Sexuality*)	1.6 : 1	Codes (*Professional ethics and ethics codes*)	1.8 : 1

Table 2. Most uncharacteristic content topics. Long labels in the brackets.

(a) Compared to all six journals		(b) Compared to *BIOETHICS*	
Topic	Ratio	Topic	Ratio
Phenomenology (*Phenomenological bioethics*)	1 : 6.9	Embryos: identity (*Metaphysics of beginning of life*)	1 : 4.6
Science: philosophy (*Medicine and general philosophy of science*)	1 : 6.5	Ecology (*Conservation and ecology*)	1 : 3.7
Disease: concept (*Concepts of disease and health*)	1 : 3.9	Metabioethics (*Metabioethics*)	1 : 3.0
Biopolitics (*Biopolitics*)	1 : 3.4	Germline (*Germline modification and gene therapy*)	1 : 2.7
Ecology (*Conservation and ecology*)	1 : 3.4	Enhancement (*(Moral) enhancement*)	1 : 2.2
Metabioethics (*Metabioethics*)	1 : 2.9	International research (*International and comparative law*)	1 : 2.2
Narratives (*Narrative ethics*)	1 : 2.9	Vulnerability (*Vulnerability in research*)	1 : 2.2
Diagnosis (*Medical diagnosis and epistemology*)	1 : 2.9	Abortion: philosophy (*Abortion: philosophical issues*)	1 : 2.1
Virtue ethics (*Virtue ethics*)	1 : 2.6	Wellbeing (*Health and wellbeing*)	1 : 2.0
Embryos: identity (*Metaphysics of beginning of life*)	1 : 2.4	IVF and surrogacy (*IVF and surrogacy*)	1 : 1.9

Two topics that seem to be especially characteristic to *JME* are *Confidentiality* (*Medical confidentiality*; top terms: *doctor confidentiality professional dr practitioner relationship profession hospital duty tell*) and *Education* (*Ethics education*; top terms: *student education school teach program learn training teaching skill professional*). Some of the most uncharacteristic topics relate to issues in the philosophy of medicine (*Phenomenology*, *Science: philosophy*, *Disease: concept*, *Biopolitics*, *Metabioethics*, *Diagnosis*).

Regarding framing topics, *JME* is especially characterised by quantitative empirical bioethics (topic: *Quantitative*). This framing topic is 7.5 times more pronounced in *JME* than the average for the other six journals (4.7 times more pronounced than in *BIOETHICS*). Methods characteristic of conceptual analysis (topic: *Concepts*; Long name: *Definitions of concepts*; top terms: *concept definition kind define notion nature criterion account distinction refer*), however, are relatively uncharacteristic of *JME*. They are 1.9 times less pronounced in *JME* than the average for the other six journals (1.1 times less than in *BIOETHICS*).

DIACHRONIC ANALYSES

To look at *JME* during different editorial periods, we divided *JME* output into seven periods. This division mostly follows who the editor-in-chief was in the given year, with two modifications. First, we omit the years during which there was an editor change. The reason is that the new editor still needs to accommodate various decisions made by the previous one. Second, for Raanan Gillon, we split his editorial period into two roughly equal periods. There are two reasons for this. First, Gillon was the editor for a relatively long time. Second, there seems to be a rather natural split around 1990, when the topic cluster PHYSICIAN AND RESEARCHER, which dominated the first two decades of *JME*, started to lose its clear prominence. Information on editorial periods is summarised in **Table 3**.

Table 3. Editorial periods used in the present study.

Editor-in-chief	First issue	Last issue	Editorial period	Years
Alastair Campbell	1:1 (1975)	6:4 (1980)	Campbell	1975-1980
Raanan Gillon	7:1 (1981)	27:2 (2001)	Gillon I	1982-1989
			Gillon II	1990-2000
Julian Savulescu	27:3 (2001)	30:3 (2004)	Savulescu I	2002-2003
Søren Holm & John Harris	30:4 (2004)	37:7 (2011)	Holm & Harris	2005-2010
Julian Savulescu	37:8 (2011)	44:7 (2018)	Savulescu II	2012-2017
John McMillan	44:8 (2018)	-	McMillan	2019-2024

Editor disruptiveness

To check whether any sudden changes in the topic composition can be located in the history of *JME*, we introduced a measure of *disruptiveness*: We calculated the cosine distance between the vector of topic prominences for a given year and the analogical vector for a five year period ending two years before the analysed year (so, for example, the reference period for the year 2020 were years 2014-2018).[vi] A high disruptiveness measure indicates that the topical composition of a given year was untypical when compared with the reference period.

Disruptiveness analysis based on all content topics (**Fig 6a**) is, however, sensitive to external shocks (e.g., the peak in 2020 was driven by the increase of prominence of *Public health emergencies*, likely in response to the COVID-19 pandemic) or to publication of special issues (e.g., the peak in 1987 was primarily driven by the publication of a special issue on medical education). An alternative disruptiveness measure, excluding from the analysis the topic that grew the most in the given year compared to the reference period, is designed to filter out the effect of such one-off events and thus track more general changes in editorial policies (**Fig 6b**). Overall, both measures seem to paint a similar picture.

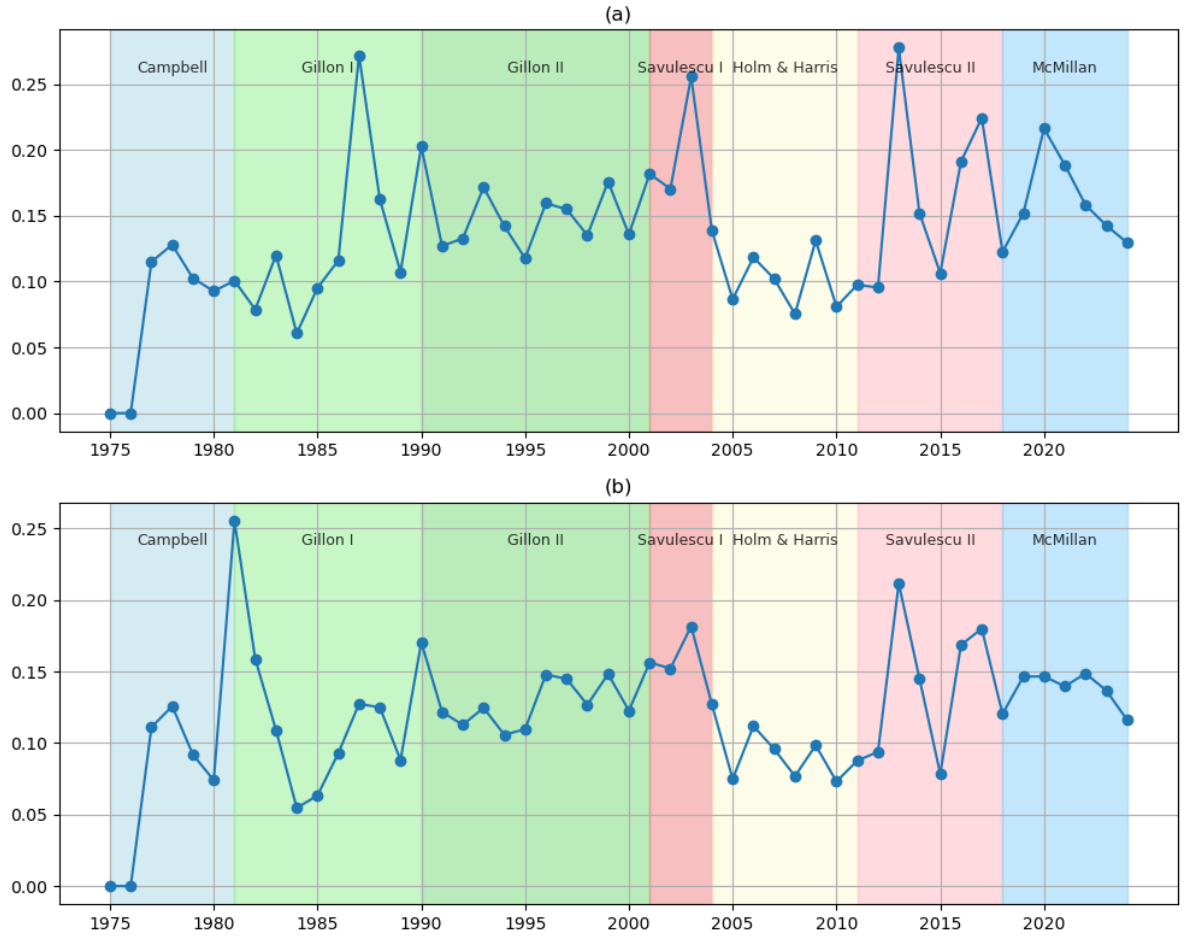

Figure 6. Disruptiveness measure across years for all content topics (a) and with the topic most growing for a given year excluded (b).

[vi] Please note that the first year for which this measure can be calculated with a reference period extending five years is 1981. Respective reference periods for years 1976-1980 are therefore shorter.

We calculated annual disruptiveness measures (with one top topic excluded) averaged across each of the four final editorial periods. Consistently with what could be inferred from the visual inspection of **Fig 6b**, Holm & Harris' editorial period was relatively less disruptive in this sense (.09) when compared with those of McMillan's (.14) or Savulescu's (first: .17; second: .15).[vii]

Change in topical constitution of *JME* over time

We calculated rolling five-year average prominences for several topics and topic clusters (**Fig 7**). The most striking pattern observed for topic cluster prominence (**Fig 7a**) was the reversal of prominence of clusters PHYSICIAN AND RESEARCHER and PATIENTS AND RESEARCH PARTICIPANTS, which took place throughout the long Gillon's editorship. We interpret that reversal as a sign of the general trend visible in our corpus: From treating bioethics mostly as ethics of medical professions (which characterised Campbell and early Gillon) to a more inclusive approach that considers also the perspective of patients and research participants. **Fig 7b** shows the temporal dynamics of framing topics, and **Fig 7c-d** shows selected individual content-based topics. We selected these individual topics simply to provide examples of different temporal patterns.

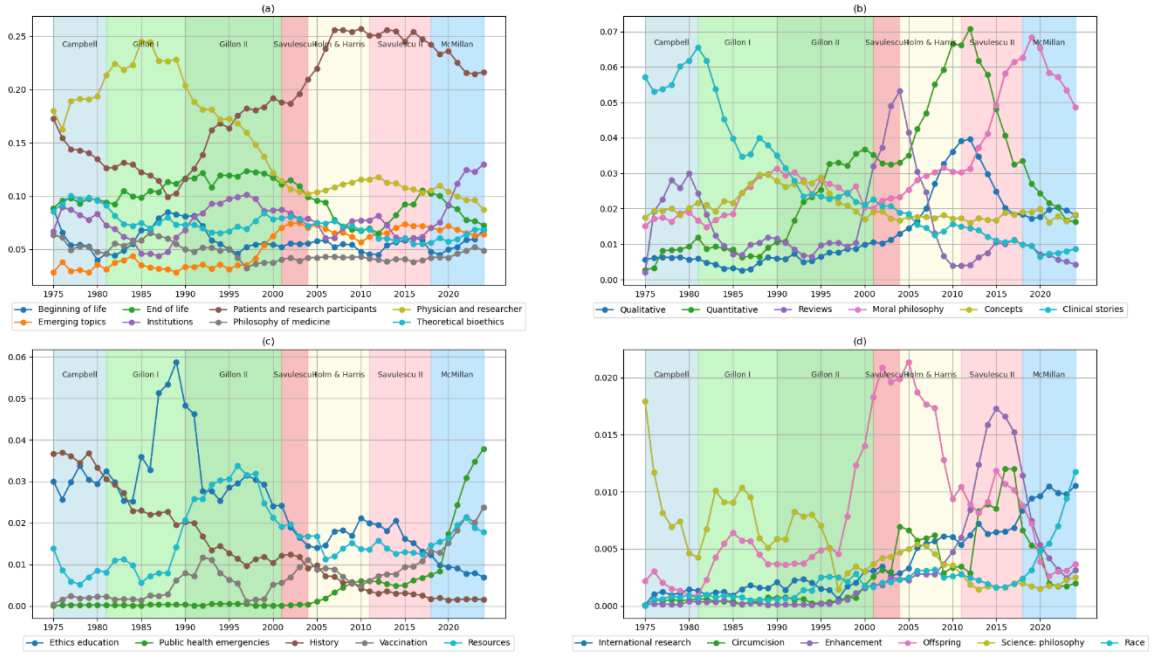

Figure 7. Rolling five-year mean annual prominence for eight content-based topic clusters (a), six framing topics (b), and selected individual content-based topics (c & d).

(Dis)Similarity of editorial periods

To compare editorial periods, we calculated cosine similarities between topic vectors for each pair of editorial periods (**Fig 8a**). Hierarchical clustering dendrogram using cosine

[vii] The same pattern emerges using the disruptiveness measure without exclusions (**Fig 6a**): Holmes & Harris – .10, McMillan – .14, Savulescu I – .21, Savulescu II – .17.

distance (**Fig 8b**) resulted in a cluster structure that coincides with early (red) and late (green) periods. We interpret these results as suggesting that while the distribution of topics in the journal changes not abruptly but rather gradually (all editorial periods are relatively similar to their immediate neighbours), over time we see a marked drift in topic distribution. Relative continuity between editors succeeding one another is compatible with an accumulation of rather large differences in topic coverage over the fifty-year period.

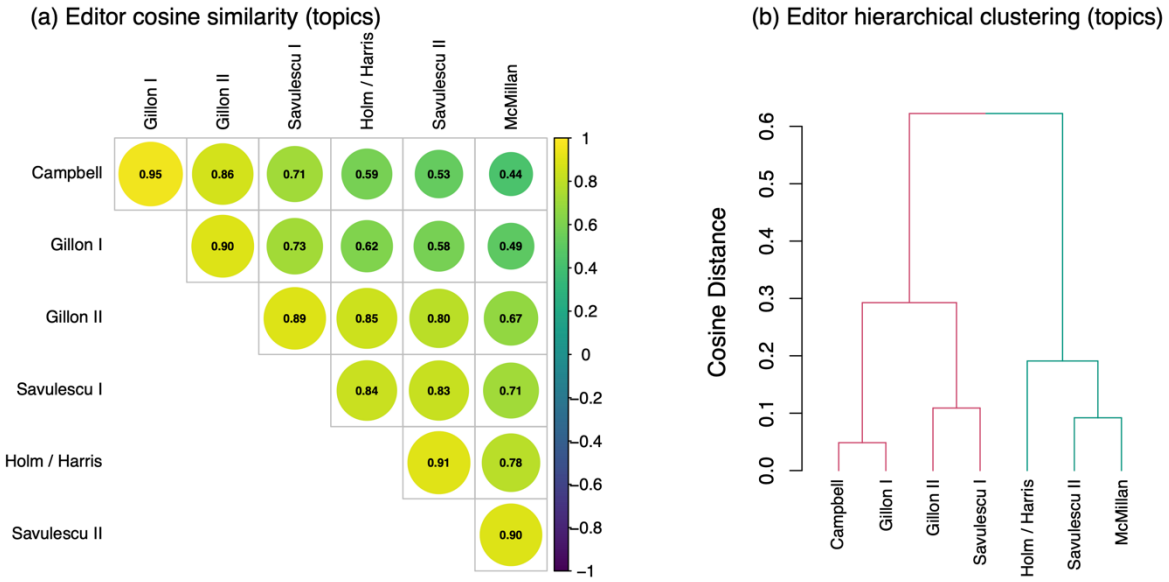

Figure 8. Editorial period cosine similarity (S_C) based on topic distribution (a) and hierarchical clustering dendrogram of editorial periods based on cosine distance (1 - S_C).

Editorial periods: Characteristic topics

Fig 9 presents topics that are most characteristic of individual editorial periods. To establish the most characteristic topics, we calculated ratios between topic prominence in the given period and the mean prominence of the given topic in each of the other editorial periods. The most extreme ratios are *Public health emergencies* in McMillan's editorial period (15.27 times more prominent than the average for the other editorial periods), driven by the COVID-19 pandemic, as well as *(Moral) Enhancement* (7.97) and *Circumcision* (6.31) during Savulescu's second editorial period as well as *Race* (6.03; McMillan's period).

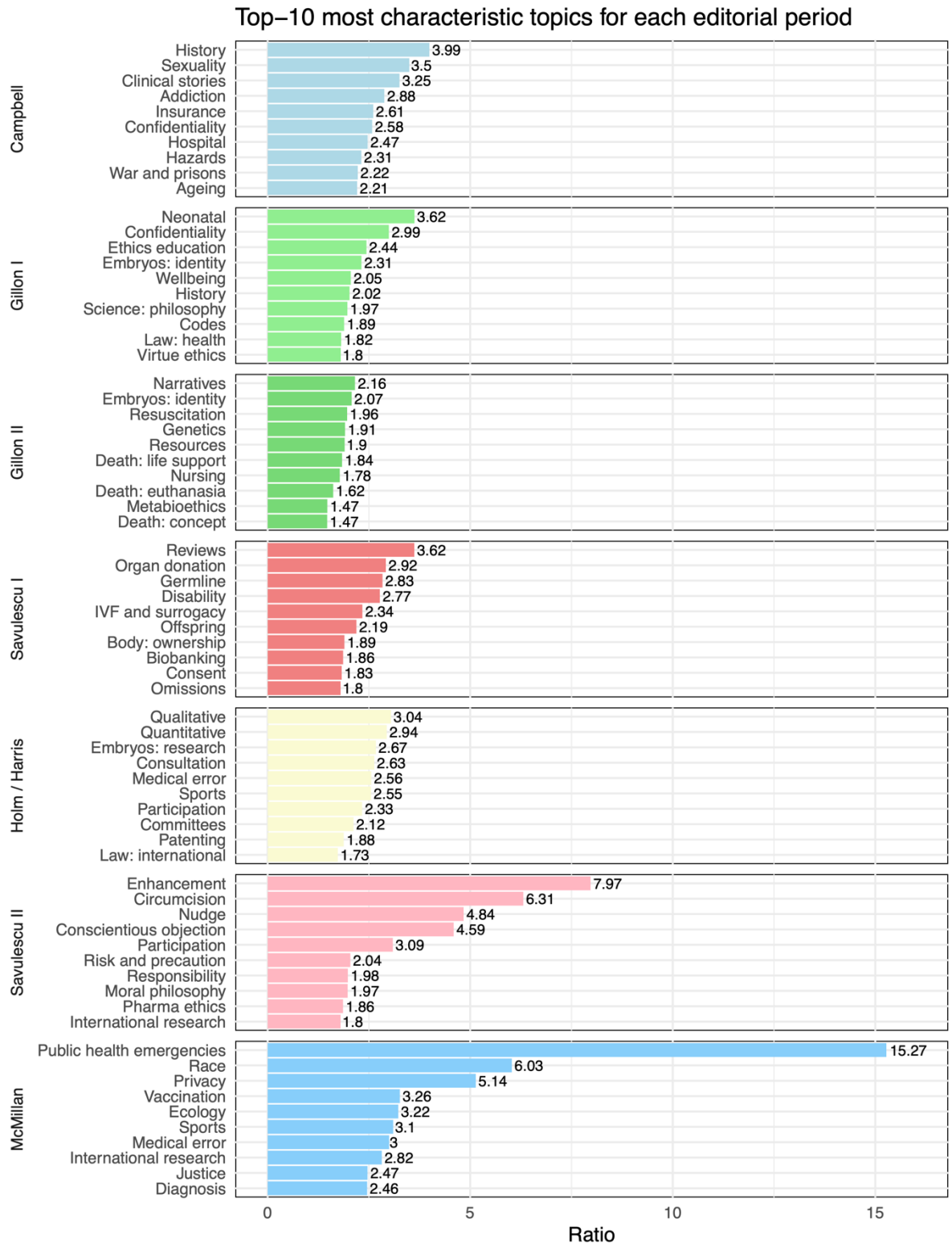

Figure 9. Topics most characteristic of a given editorial period. Ratio between mean topic prominence in the given editorial period and average of mean prominences for this topic in the rest of editorial periods.

EDITORIAL REMARKS

As the final step in our analyses, we sifted through editorials published by the editors during transition periods in which they describe their plans for the journal and retrospective reflections on their past editorship. Below, we describe some of these editorial observations and their interpretation in the context of our data. These four cases serve as examples of how corpus data can help assess claims concerning how a specific journal develops over time.

Clinical stories. In the first issue of *JME*, Campbell[7] introduces the 'Case Conference' series, aimed at presenting 'actual situations of dilemma with a selection of opinion on the decision taken.' A quarter of a century later, in 2001, however, Gillon[8] writes: '[O]ne of my greatest regrets has been my failure to continue Roger Higgs's excellent pioneering "case conference" series.' In the same editorial, Gillon states that '[o]ne of the most satisfying' achievements of the journal was 'at the coal face: medical ethics in practice' series. However, in the same issue, Tony Hope[9] recognizes -- with disappointment – that it was difficult to attract articles for this series, in which clinicians 'describe real situations that raise ethical problems without the burden of undertaking much, or indeed any, philosophical analysis.' Looking at the distribution of framing topics (**Fig 7b**), one can observe that *Clinical stories* was by far the most pronounced framing topic during Campbell's editorship, with a downward trend starting in the early years of Gillon's editorship. And while Savulescu, in his 2001 editorial,[10] writes that clinical ethics '[c]ase discussions are particularly sought,' this framing topic continued to lose prominence.

Ethics education. Gillon further writes in his farewell editorial in 2001[8] that a 'further cause of satisfaction has been the journal's involvement with medical ethics education, especially for medical students,' a sentiment echoed by Hope in the same issue,[9] who stresses 'the major role that the journal has played in developing the teaching of medical ethics.' Looking at the topic *Ethics education*, indeed, it is especially pronounced during Gillon's editorship, with a very pronounced focus on this topic in the late 1980s (see **Fig 7c** and **Fig 9**).

Quantitative and qualitative empirical bioethics. In 2001, Hope stressed as an achievement of the journal 'the fostering of research that combines empirical methodology with medical ethics.'[9] Savulescu, in the same year, lists among the *JME* values the following claim: 'Empirical research, including social science research, is relevant to the resolution of ethical dilemmas.'[11] While Holm and Harris do not discuss empirical ethics in their brief 2004 and 2011 editorials[12 13] and Savulescu in 2011 only briefly refers to the value of empirical medical ethics,[14] in 2018, the mood seems to have changed significantly. Savulescu and his colleagues describe their perceived failures 'in bridging the gap from empirical research to normative arguments and recommendations,'[15] and McMillan states that 'narrowly empirical approaches to medical ethics [...] run the risk of missing what matters in medical ethics.'[16] Looking at **Fig 7b**, the fate of empirical bioethics has been changing dramatically: It enjoyed substantial growth during the second half of Gillon's editorship (in its quantitative kind) and Holm & Harris' editorship (both quantitative and qualitative) while experiencing an equally dramatic decline starting from Savulescu's second editorship.

Moral philosophy. In the 2018 editorial, McMillan mainly focuses on calibrating the relationship between medical ethics and philosophy.[16] The editorial's title is 'Good medical ethics,' which directly alludes to the farewell published by the previous editorial team, called

'Philosophical medical ethics: more necessary than ever.'[15] McMillan writes: 'Good medical ethics is not philosophy. The degree of scepticism, the narrow focus on a search for truth, the technical nature of some philosophy and it not needing to deliver normative and practical ethical conclusions mean that a narrowly philosophical approach is unlikely to be good medical ethics.'[16] The recent decline of the framing topic *Moral philosophy* (**Fig 7b**), which covers language associated with abstract normative argumentation typical of moral philosophy, may be interpreted as a result of McMillan's scepticism regarding 'a narrowly philosophical approach' to medical ethics.

CONCLUDING REMARKS

In this paper, we describe a series of analyses based on full-text data of texts published in *JME* during the first five decades of its existence. These analyses allow us to characterise the journal in terms of its topical composition and in relation to a set of other key journals in bioethics and philosophy of medicine, as well as observe changes in topical composition over time and under different editors.

A meta-scientific lesson from this study is that different styles of editorial work do matter, albeit only to some extent. On the one hand, some patterns seem to represent the reaction to the more general trends in the field. For example, this is how the relative decline of the prominence of cluster PHYSICIAN AND RESEARCHER and the relative increase of the PATIENTS AND RESEARCH PARTICIPANTS can be interpreted. The same is true for fluctuations in the prominence of some topics: the recent growth in popularity of topics *Race* or *Privacy* seems to stem from the more general shift of interest rather than specific editorial decisions. On the other hand, there are some clear editor-specific trends in *JME* that may have stimulated the shifts of interest in other journals. For example, one can speculate how much the general growth of interest in topics like *Enhancement* or *Circumcision* in the second decade of the 21st century was stimulated by the editorial decisions made in the *JME*. The 50 years of *JME* history provide examples of both relatively conservative editorships and ones that managed to shift the thematic focus to different areas. Moreover, our analysis suggests that editorial policies announced by incoming editors sometimes have observable consequences in the years that follow.

More broadly, this paper is an exercise in quantitative -- or data-driven – history of social science and the humanities,[17-19] and we hope that some of the methods we devised – such as the disruptiveness measure we used – can be fruitfully applied to other datasets.

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