Framing Ageing as a Medical Problem: Public Discourses on Older Adults, Health Risks and Tecnoscientific Solutions in the UK and Italy

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Abstract

This work aims at contributing to the debate around the social representations of ageing, here by considering the theory of "biomedicalisation of ageing", for which getting older is transformed into a medical problem with specific health risks that can be treated thanks to the help of technoscientific innovations. A considerable body of literature has created and developed this theoretical perspective, mainly through conceptual contributions or with qualitative methods, but different from most research, our paper contains a comparative-quantitative analysis of two large datasets, consisting of all the articles regarding the older population published online on *the Guardian* (UK) and *la Repubblica* (Italy). These articles underwent a quantitative analysis based on topic modelling techniques to identify and analyse the relevant topics. In parallel, we developed some synthetic indices to support the analysis of how news about older people is "biomedicalised" in media coverage. First, our analyses show how, during the period under scrutiny (1985-2021), while older adults have been increasingly framed as subjects at risk, the technoscientific solutions typical of the biomedicalisation era (i.e., personalised medicine and devices for self-monitoring vital parameters as well as lifestyles) have become increasingly relevant in the media sphere. Second, the analysed data show how biomedicalisation processes are interwoven with the ongoing social, cultural and economic arrangements (e.g., reduction in welfare state spending and exacerbation of the ageing population). Finally, focusing on the 2020-2021 period, it is observable how during COVID-19 public attention to the health risks of older adults has further increased; at the same time, there has been a diminishing emphasis on technoscientific solutions within the public sphere.

Keywords

ageing; biomedicalisation; media narratives; comparative analysis.

1. Introduction

Modern societies are characterised by massive social representations that define the rights and duties of people in front of ageing and the effects of this process on bodies, social, physical

and cognitive abilities (Kholi and Meyer 1986). As is well known, these representations are socially constructed, changing both across space and time, and they specifically concern older people, that is, the population target that is generally judged as intensely affected by biological ageing. For a long time, older people have been represented as passive recipients of pensions and exposed to specific risks (e.g., poverty, social segregation, diseases) that have to be managed with the help of welfare services and family caregivers (Cumming and Henry 1961). Over the past four decades, social sciences have highlighted how, in parallel with the emergence of the so-called ageing society and crisis of the welfare state, the social expectations around older people have dramatically changed (Holstein and Minkler 2003; Bowen and Skirbekk 2017). Thanks to the circulation of concepts such as "active ageing", "third age" and "successful ageing" that began to emerge in the 1980s, older people have been increasingly portrayed as subjects who, in contrast with the typical stereotype of the passive and dependent older people, can stay healthy, independent and productive (Laslett 1989; Lassen and Moreira 2014). This change has often been investigated by taking into consideration new and old media (see newspapers, television and social media) as an important source of data (Holstein and Minkler 2003; Markson and Taylor 2000; Kessler et al. 2004; Asquith 2009; Rozanova 2010; Shimoni 2018).

In this frame, our work aims at contributing to the debate around the social representations of ageing, here considering the theory of the "biomedicalisation of ageing" (Estes and Binney 1989), for which biological ageing can be transformed into a medical problem that can be treated with the help of technoscientific solutions. The biomedicalisation of ageing can be easily framed in the above-mentioned wide trend that presents ageing as an irreversible process associated with decadence, passivity and inactivity. This theoretical construct emphasises the role of medical science in contrasting biological ageing, modifying the bodies and lifestyles of the senior population. To understand if biomedicalisation of ageing theory is a conceptual framework suitable for interpreting changes in the social representations of ageing over the last decades, we consider the public discourse developed in two broadsheet newspapers (*la Repubblica* and *The Guardian*) belonging to two different European contexts (Italy and the UK), particularly regarding these countries' healthcare systems, cultural arrangements and demographic trends. From our perspective newspapers, as well as other contemporary media, are generative elements engaged in the exchange, reproduction and transformation of the social meaning of health and medicine: they are at the same time agents contributing to the development of social processes and an arena in which these processes take place (Neresini et al. 2019, 2). This latter aspect is particularly emphasised from authors that chose to study press coverage because "newspapers cover topics when institutional actors [...] turn their attention to them, particularly when attention leads to extensive debate, legislative proposals, or executive action" (DiMaggio et al. 2013, 573). As pointed out by other studies (Fowler and Gollust 2015; De Dobbelaer et al. 2017; Stroobant et al. 2019; Hallin et al. 2021), this is particularly evident in health journalism that, more than other journalistic beats, tends to reflect the concerns and the priorities of institutions as well as other influential actors of healthcare sector (e.g., experts, pharmaceutical companies, authoritative research centres). Claiming that there is a deep connection between these actors and media does not mean to affirm that these latter are passive recipient of content decided somewhere else. Rather, we assume that in health and medicine sector, media are particularly aligned with institutions, experts and other actors, collectively contributing to the co-production of representations of health (Hallin et al. 2021, 701).

The current paper is structured as follows: after an in-depth presentation of the debate about the biomedicalisation era, we describe the contexts, the research questions and the methods that of our study. Then, we present and discuss the main findings of our study before making some final remarks concerning the extent to which biomedicalisation of ageing has taken place in the two considered national contexts.

2. Biomedicalisation and Ageing

One of the most successful attempts at conceptualising the changes that have taken place over the past few decades in the field of health and medicine has been conducted by Clarke and colleagues (Clarke et al. 2003; 2010a; 2010b; Clarke 2010) with their contributions concerning the *biomedicalisation era* (1985-ongoing). The "medicalisation" era (1940-1990), as deeply explored by Peter Conrad (1992; 2007), has been marked by processes through which aspects of life previously outside the jurisdiction of medicine (such as anxiety, transsexuality, infertility and impotence) come to be represented and treated as medical problems. As explained in the following excerpt, the concept of biomedicalisation has been created with the aim of underlining the continuities and discontinuities between the medicalisation era and a subsequent historical era:

> We signal with the "bio-" in biomedicalisation the transformations of both the human and nonhuman made possible by technoscientific innovations, such as molecular biology, biotechnologies, genomisation, transplant medicine, and new medical technologies. That is, medicalisation is intensifying but in new and complex, usually techno-scientifically enmeshed ways. (Clarke et al. 2010a, 47)

Biomedicalisation deploys a broad range of trends, that is, the emergence of an arena in which biomedical knowledges, technologies, services and capital are increasingly interconnected; a new and intense focus on health (in addition to illness and injury), on the detection of health risks and on interventions aimed at treating them; the transformation of biomedical practices where clinical interventions are increasingly reliant on technoscientific innovation; the progressive centrality of information infrastructures and technologies in the production of biomedical knowledge; and the transformation of bodies to include new proprieties and consequent emergence of new identities. As it can be easily inferred from its main features, biomedicalisation takes shape within an economic and political framework strongly influenced by neoliberal thinking, characterised by cuts in public spending, an emphasis on individual responsibility and the involvement of private corporations in key governmental functions such as the provision and the development of healthcare services (Dickenson 2013).

A wide range of studies has paid attention to the shapes of biomedicalisation that have taken place in the conceptualisation of ageing and practices enacted to ensure the health of the older population. The term "biomedicalisation of ageing" was coined several years before the attempts made by Clarke as a way to define in detail the complex trends that compose biomedicalisation processes. With this term, Estes and Binney (1989) defined the phenomenon whereby ageing comes to be framed as a matter of biomedical interest,

contributing to the wider reorganisation of healthcare around technoscientific interventions and modes of prevention and consumption.

In their seminal contribution, the two authors defined the biomedicalisation of ageing as a phenomenon composed of two dimensions: i) the social construction of ageing as a medical problem and ii) the praxis of ageing as a medical problem. These two aspects of biomedicalisation of ageing have attracted the interests of several contributions, mostly belonging to medical sociology and science and technology studies[1] (STS), hence stimulating a lively debate.

First, several authors have reflected on how, in the biomedicalisation era, biological ageing and its consequences have started to be conceived of as a medical problem that brings with it pervasive health risks. The growing connections between the market and biomedicine have favoured the creation of screening techniques and self-monitoring technologies aimed at detecting possible health threats connected with ageing for which there are specific care paths, here modelled on the economic interest of big corporations and private companies. In this frame, several conditions that were once considered a normal consequence of ageing have become pathologies that can be prevented or treated in their early stages. Some common examples of this transition that garnered the interests of STS scholars and medical sociologists are the shift from senile dementia to Alzheimer's disease (see Moser 2008; Moreira and Bond 2008), the transition from impotence to erectile dysfunction (Mamo and Fishman 2001; Loe 2004; Marshall 2010; Ferrero Camoletto 2020) and the pathologisation of menopause and widespread use of hormone replacement therapies (Murtagh and Hepworth 2003; Palmlund 2006; Singh and Sivakami 2020). A recent evolution of the pathologisation of ageing is the problematisation of the entire ageing process: a considerable number of contemporary biogerontologists, rather than pursuing disease-specific explanatory models, have been focusing on the common biological basis of all the diseases that would seem to characterise the lives of the older people (Moreira and Palladino 2009). Within this framework, the so-called "anti-ageing medicine" has arisen, not only aiming at alleviating the symptoms of ageing or curing the diseases associated with old age, but also making advancements in genetic manipulation or chemical interventions, here with the main aim of extending human lifespan or, even, abolishing ageing (Vincent 2006).

Second, the growing interest of biomedicine in ageing and age-related diseases has been intertwined with the spread of technoscientific innovations that are aimed at minimising health risks or treating them when they materialise into full-blown diseases (Crawford 2004). There are two specific kinds of interventions that are typical of the biomedicalisation era and that have been particularly adopted with the aim of intervening in the ageing process.

On the one hand, there is personalised medicine[2], which is intended as a clinical field in continuous advancement that aspires to provide diagnoses and treatments tailored to each patient based on all patient data, including genetic and genomic ones (Ginsburg and Willard 2009). At the turn of the twentieth and twenty-first centuries, personalised medicine has taken particular relevance on the global scale, both inside and outside clinical debate (Prainsack and Naue 2006), thanks to big transnational or international projects (such as the Human Genome Project or international HapMap project), which have aimed at developing new infrastructures for "genome mapping". Biological ageing has been among the fields of application of this kind of medicine, which has been widely applied in the treatment of various diseases typical of old age

(first cancer but also dementia and cardiovascular diseases; Henney 2012) and in the exploration of experimental interventions aimed at manipulating the roots of the mechanisms behind ageing (Fuellen et al. 2016). In parallel, personalised medicine has attracted both public and private capital, become increasingly interwoven with a market logic (in particular, the connections with pharmaceutical and information technology industries) also stimulating the public agenda to understand new ways to incorporate personalised services in national health systems.

At the same time, the relationship between biomedicalisation and ageing has been characterised by the transformation of good or bad health into a moral responsibility of the individual (Petersen and Lupton 1996; LeBesco 2011; Lupton 2013), here with a particular reference to older people. The emphasis on individual responsibility seems to have become particularly pervasive also in the field of prevention through lifestyles, pushing individuals to reorganise their daily lives around the moral obligation of "health maintenance", which is typical of the biomedicalisation era (Clarke et al. 2010a, 63). Concepts such as *third age* (a time period in one's life between the completion of primary family and career responsibilities; Laslett 1989) and *active ageing* (concerned with enabling people to remain independent and achieve their potential regardless the age; Lassen and Moreira 2014), despite their differences, share the aim of pushing older people to actively manage their own ageing processes in the "right way", that is, maximising their self-worth and staying safe as long as possible. In parallel with the massive circulation of these concepts in the public sphere (e.g., in media, in institutional and experts' discourses, in advertising messages, etc.), older people are increasingly pushed to adopt technoscientific practices that embed biomedical knowledge (e.g., advice for improving the adherence of individuals to clinical guidelines) and technological devices (e.g., self-tracking devices such as mobile phones, apps and wristbands), here with the aim of treating the health issues connected with ageing.

3. Methodological Framework and Empirical Contexts

Our main purpose is to understand if the representations of the health issues connected with old age are consistent with the theory of the biomedicalisation of ageing. A considerable body of literature has created and developed this theoretical perspective, mainly through conceptual contributions or with qualitative methods (Markson and Taylor 2000; Kessler et al. 2004; Asquith 2009; Rozanova 2010; Shimoni 2018), but our paper aims at measuring the onset and development of the two main aspects of the biomedicalisation of ageing (the social construction and praxis of ageing as a medical problem) through a quantitative study. As noted in the introduction, we will focus on the public discourse, mainly with reference to mainstream media.

To adopt quantitative methods for exploring public discourse about ageing is motivated, at first, by the opportunities offered by the digitalisation of huge quantities of text that, according to Krippendorf (2004, 43) shifts "the bottleneck of content analysis from the costs of access and tedious human coding to the need for good theory, sound methodology, and software". In our case, having at disposal huge archives of newspaper articles allowed a shift from qualitative content analysis to quantitative methods suitable for analysing a great number of texts and, at the same time, capturing in depth their meaning. As elucidated by DiMaggio and colleagues (2013), topic modeling, along with other methods aimed at identifying

co-occurrence patterns of specific terms, effectively addresses this challenge, since they enable inductive and automated text analysis that recognizes the relationality of meanings. This latter aspect is particularly important for sociologists interested in understanding how a certain phenomenon is portrayed in a certain text, without violating a fundamental principle of non-positivist sociology, i.e., that meaning emerges from relations among terms included in a discourse rather than inhering within them (*ivi*, 577). Indeed, by focusing on the recurrent and emergent associations of words, it becomes possible to treat terms as varying in meaning across different contexts. Drawing on these methodological insights, a certain number of scholars have recently used quantitative content analysis for exploring if and how processes associated with biomedicalisation are emerging in newspapers (see Hallin et al. 2013; 2021; De Dobbelaer et al. 2017; Neresini et al. 2019; Crabu et al. 2021).

These studies, in line with social constructivist approaches, have been marked by a shared effort to explore how news media, along with the voices of actors that find expression through them, influence, negotiate, and shape the representation of health (Hallin et al. 2021, 701).

3.1 Research Questions

Thus, we are first interested in understanding how biomedicalisation has changed the ways of representing ageing in contemporary society, transforming it into a medical problem. Within this frame, becoming older is a process that brings with it specific health risks that can be analysed and detected with the aim of reducing them or their impact in the case that they become real. Therefore, the first two research questions (RQ1, RQ2) have been formulated as follows:

- *RQ1: How and to what extent has media coverage over the past decades framed ageing as a medical problem associated with specific risks?*
- *RQ2: How and to what extent has media coverage over the past decades paid attention to solutions aimed at treating health risks connected with ageing?*

In addition, taking into account the scarcity of literature concerning biomedicalisation processes and ageing during the COVID-19 pandemic, we are interested in understanding how and if the COVID-19 outbreak has influenced media coverage concerning older adults' health, here with reference to their health risks and the treatment for these latter. Indeed, on the one hand, the recent literature on COVID-19 and media representations has remarked how this healthcare outbreak would have favoured a strong circulation of ageist stereotypes about older adults, who are intended as passive subjects that need to be protected (Ayalon et al. 2021; Zhang and Liu 2021) and/or as a burden for society (Fraser et al. 2020; Meisner 2021); on the other hand, it is not clear if the pandemic has obstructed the circulation of representations of ageing consistent with the biomedicalisation era, in which dependency and frailty are conceived of as preventable and treatable. Our third research question (RQ3), therefore, can be outlined as follows:

- *RQ3: How and to what extent has the COVID-19 pandemic affected the ways in which media represent health risks connected with ageing and its treatment?*

The combined exploration of these three substantive research questions can allow us to verify whether and to what extent biomedicalisation processes are pervading health and medicine narratives in the public sphere while also investigating the possible effects of COVID-19 on these processes.

3.2 The Considered National Contexts

We focus on medical and health accounts concerning ageing in *la Repubblica* (Italy-based newspaper) and *The Guardian* (UK-based newspaper), with particular attention to the extent to which media narratives have become "biomedicalised". Comparative analysis is an effective approach to test – across different national contexts – the existence of a phenomenon that has been theorised as typical of Western societies. Moreover, the differences existing among these contexts can give insights into general processes – namely healthcare system model, cultural arrangements and demographic trends – that influence the development and diffusion of the biomedicalisation of ageing.

While we recognize that the two selected newspapers do not fully represent the broader media ecology in the UK and Italy, we believe this limitation also offers certain opportunities for the aims of our study. Their status as elite newspapers makes them particularly attuned to scrutinizing medical and health issues. Moreover, their notable similarities – in terms of news framing, editorial policies, and audience demographics – enhance their suitability for conducting a consistent comparative analysis (see also Neresini et al. 2019, 2). Additionally, the extensive online archives of both newspapers allowed us to construct a dataset that aligns coherently with our chosen methodological framework. Thus, we could hardly have found better newspapers for exploring the topic of the biomedicalisation of ageing, while remaining aware that they provide access to only a portion of the possible representations of ageing within our society.

We have focused on these two newspapers because they paradigmatically exemplify diverse economic, social and political contexts in Europe that are exemplars of different healthcare system models. In the UK, the National Healthcare Service was born after World War II, inspiring several other governments – as in the cases of Italy, Spain, Sweden, Denmark, Norway, Finland and Canada – to build universal and public healthcare systems (Lameire et al. 1999); starting in the early 1990s, this model has been radically reformed following neoliberal economic theory. With the explicit aim of controlling escalating costs and increasing organisational efficiency, the British government has introduced a quasi-market framework in their National Healthcare Service. This shift favoured the widespread use of private health providers in competition with public ones and supported the adoption of business management models in the latter areas (Kitchener 1998). In the early 1990s, after its foundation in 1978, even the Italian National Healthcare System has been characterised by the above-mentioned trends but in a less systematic and uniform way (Giarelli 2017). If some regions seem to follow the British neoliberal model (e.g., Lombardia, Lazio, Campania), with a growing role of private organizations in the provision of healthcare services, in others (e.g., Emilia Romagna, Trentino Alto Adige, Piemonte), this phenomenon seems to be still limited (Pavolini 2011). In both countries, the introduction of neoliberal principles in healthcare systems has been accompanied by a modest growth of domestic general government health expenditure in the 2000-2010 period, especially taking into account the dramatic increase of care demand, and by a strong decrease since 2010, which is attributable to the global financial crisis. In Italy, public health expenditure decreased from the 78.45% level in 2010 to the 73.74% level in 2017. Meanwhile, in the UK, this decline was more modest, shifting from the 82.74% in 2010 to the 79.66% in 2017[3].

Even from a purely cultural perspective, the UK and Italy have different reference models. Assuming as a reference the well-known typology of national cultures provided by Geert Hofstede (2011), the UK has been traditionally characterised by "individualism", in which individuals are focused on achieving their own goals and taking care of themselves and their close relatives. In contrast, Italy has historically been characterised by a national culture that brings it closer to what Hofstede calls "collectivism", in which individuals are integrated into larger communities based on practices of mutual support and control, as well as collective identities and social norms that are historically consolidated. Consistent with this cultural model, in Italy, as in other Mediterranean countries, the family has historically played a pivotal role in providing daily care for relatives with significant health issues (e.g., people with disabilities or chronic conditions) and/or limited autonomy (e.g., children, older people without specific diseases), thereby ensuring their overall well-being and compensating the existing gaps in welfare provisions (Miele 2021).

However, it is necessary to underline that, over the past few decades, phenomena such as the demographic crisis, the increase of the presence of female workers in the labour market and growing emphasis on personal realisation have weakened the importance of informal ties and support in Mediterranean contexts (Miele 2021).

A final difference between the UK and Italy concerns the demographic composition of the population.

Looking at the old age dependency ratio[4], although at the beginning of the 1990s, the UK was slightly an "older" country than Italy (in 1993, the index value was 27% in the UK compared to 26% in Italy[5]), the situation has completely reversed in the following years. In 1995, both countries reached the same value (26.9%), while in 2000, Italy's old age dependency ratio rose to 29.2% (compared to 27% in the UK). By 2010, Italy's ratio had increased to 33.4% (versus 27.8% in the UK), and finally, in 2020, it reached 38.5% (compared to 32% in the UK). Thus, both countries are undoubtedly affected by an ageing population, but this process has been much more pronounced in Italy.

3.3 Data Analysis

Our analysis is based on two large datasets of all the health- or medicine-related articles found in the public archives of *la Repubblica* and *The Guardian*. Article selection was performed by searching the online public archives of *la Repubblica* (1,736,384) and *The Guardian* (2,315,794) from 1985 to 2021, using the keywords *anzian*/terza età* in the first archive and *elderly/senior*/older adult*/third age* in the second one. The open repository "The Guardian Open Platform" was used for *The Guardian*, while the open archive "la Repubblica dal 1984" was used for *la Repubblica*. After the research was conducted using the above-mentioned keywords, the dataset in *la Repubblica* comprised 46,336 articles, while there were 49,834 articles in *The Guardian*. These two datasets have been labelled as "general datasets" (Table 1).

Given the analysis that would be realized, the different type of articles – i.e., such as short news, comments, opinions, and so on – have been considered as similar, only excluding the articles with less than 300 characters because they are too short for automatic techniques like topic modelling, or they could be just advertisements.

	The Guardian	*la Repubblica*
Total articles published 1984-2021 (public archives)	2,315,974	1,736,384
Total articles related to elderly (general dataset)	49,550	46,336
% of articles relating to the elderly on the total number of articles published	1.62	2.67
Total articles related to elderly limited to those related to technoscience (technoscientific dataset)	3,918	3,103
% of technoscientific articles relating to the elderly on the total number of articles related to elderly	10.43	6.70

Table 1.

The composition of the considered datasets.

These articles were analysed through both a manual and iterative analysis of topics extracted by Latent Dirichlet Allocation (LDA)[6].

Although it is a quantitative methodology, the analysis using topic modelling requires continuous interaction between the researchers' interpretations and the algorithm, starting from decisions on the number of topics whose existence is hypothesised within the dataset up to the attribution of the topics' labels using both the words most associated with each of them. Moreover, we manually analysed the 30 articles whose text most closely reproduces the textual features of a given topic as a further source to better identify to which semantic domain each topic is referring to and thus as a tool to better define an appropriate label. In this way, it has been possible to explore the content of the topics with greater accuracy, especially when it came to capturing aspects relevant to our research questions. So, in line with a constructivist approach, we are fully aware that the conducted analysis was without doubts influenced by the theoretical backgrounds, interests and interpretations of the researchers that actively participated to the enactment of analytic categories (see Hardy et al. 2004, 21).

In the first LDA run, we worked with 40 topics for each general dataset, that is a topics quantity that after some explorative attempts resulted to be appropriated to obtain topics nor too generic, nor too specific. The resulting topics that were coherent with our research interests (i.e., regarding issues connected with health, medicine and clinical research issues) were only three for each newspaper. This first run thus provided the opportunity to contextualise the specific public discourse about ageing and health within the general media coverage about older people.

With the aim of deepening the analysis on ageing and biomedicalisation – and thus analysing data closer to our research questions – we conducted a second run of the LDA on a more focused dataset, here extracted by the initial one, containing only articles concerning technoscientific issues (technoscientific dataset). These articles were selected by applying machine learning techniques for automatically classifying texts with a specific focus on science and technology issues.

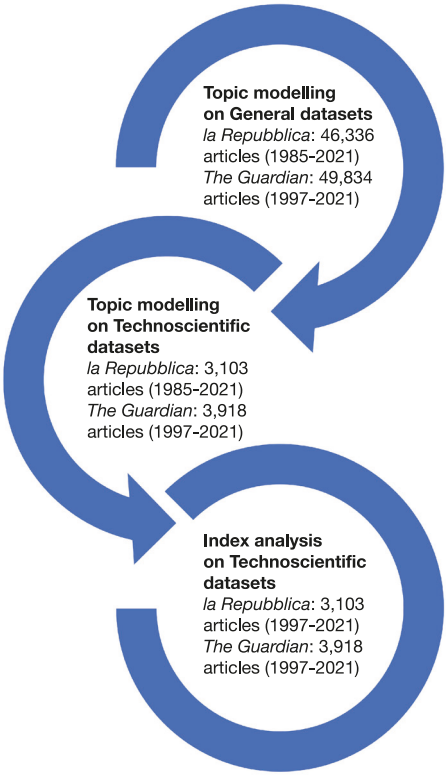

Figure 1.
The stages of the conducted comparative study.

To this aim, we used an automatic classifier that we have already applied and tested (Neresini et al. 2019; Crabu et al. 2021; Neresini et al. 2023). The classifier has been trained through a sample of articles in which there are both articles related to technoscience and not; this training set has been manually coded assuming that an article should be considered "related to technoscience" if it fulfils at least two among the following six criteria: a scientist is mentioned, a scientific journal is mentioned, a research organization is mentioned, a scientific discipline is mentioned, the text talk about a research process or an innovation one, scientific instruments and/or technological artefacts. This allowed us to select articles in which technoscience plays a relevant role outside those published in the newspapers' sections specifically dedicated to science, technology and/or medicine (Cammozzo et al. 2020; Di Buccio et al. 2022)[7]. Following this approach, we collected one technoscientific dataset for *la Repubblica* (3,103 articles) and one for *The Guardian* (3,918) (see Table 1). Given the reduced number of articles obtained in that way, we extracted 20 topics for each technoscientific dataset, again finding this number appropriate in order to have a balanced output between generality and specificity. Then we selected 15 topics consistent

Index	Associated keywords (ITA)	Associated keywords (ENG)
Risk category	Person* a rischio; categori* a rischio; grupp* a rischio; popolazion* a rischio; gente a rischio; soggett* a rischio; soggett* con un rischio; diagnosi precoce; epidemiolog*; screening; predisposizione; colpisce/colpiscono/colpit*	At risk; to a risk; people at risk; risk category; risk categories; risk group; risk groups; early diagnosis; early diagnoses; epidemiological; epidemiology; epidemiologist; epidemiological; screening; predisposition; affect/affects/affected
Risk factors	Fattor* di rischio; indicator* di rischio; indica un rischio; condizion* di rischio; esposizione a; diagnosi precoce; trattamento precoce; fas* inizial*; epidemiolog*; screening, probabilità	Risk factor; risk factors; risk-factor; risk-factors; risk condition; risk conditions; a higher risk; higher risks; exposed to; exposure to; early diagnosis; early diagnoses; early treatment; early treatments; early stage; early stages; epidemiological; epidemiology; epidemiologist; epidemiological; screening; screenings; likelihood; probability; probabilities
Personalised medicine	Personalizz*; individualizz*; terapia genetica, farmacogenomic*; terapia genica; medicina di precisione; medicina personalizzata/su misura	Personalis*; individualis*; gene therapy; genetic therapy; pharmacogenomics; precision medicine; personalised medicine; tailored medicine
Lifestyles	Fumator*/fumo/fumare/sigarett*/ tabacco/tabagismo; dieta/e; bere/alcool/ alcol/alcolici/superalcolici; vizio; sostanze stupefacenti; obesità/sovrappeso; abitudini/stile di vita/stili di vita; bmi/ indice di massa corporea; consum* di alcool/di alcolici/di superalcolici; attività fisica/praticare uno sport/praticare degli sport/praticare sport/fare sport seguire una dieta/osservare una dieta/regime alimentare/corretta alimentazione; proteggersi/volersi bene/coccolarsi; ipertensione; attenzion* verso se stessi/ cura se stessi/cura di sé/cura del corpo; consumo eccessivo; sana e corretta	Smoke/smokers/smoking/cigarett*/ tobacco/tobacco use/tobacco addiction; diet/diets; drink/alcohol/alcool/ alcoholic/liquors; vices; substance abuse; obesity/overweight; habits/ lifestyle/lifestyles; bmi/body mass index; alcohol consumption/consumption of alcohol; physical activity/to play sports/ playing sports/to play a sport/playing a sport; a diet/a balanced diet; to protect themselves/protecting themselves/to love themselves/loving themselves/pamper themselves; self-care/body care/attention to yourself/attention to themselves; over use; healthy and correct

Table 2.

List of the indices and the selected keywords developed to analyse the content of the articles.

with our research interests in the Italian newspaper and 16 in the British one. Hence, to analyse the topics treated by the public discourse concerning ageing and biomedicine, in the empirical section, we discuss the results of topic modelling conducted on the technoscientific datasets.

Finally, to gain more meaningful insights regarding our RQs, we developed some indices (Table 2) to exploit a manually selected list of keywords[8]. Each index provided a score to be assigned to each article. The index's score was calculated based on the frequency of occurrence of the keywords in the document and normalisation based on the length of the article. For example, the more an article contained words such as "at risk", "risk group", "early diagnosis" or "screening", the more it was supposedly related to a talk about "risk category" or relate its contents to that concept. The keywords have been selected following a mix of qualitative/quantitative steps: for each index, we have first selected a sample of 30 articles in which we can recognize a clear reference to the issue related to the index; this sample has been extracted manually. Then a list of candidates keywords has been extracted using TF_iDF, i.e., a measure that indicates which words are more specific for a given corpus in comparison to another one; hence an initial version of the index has been calculated on a sample composed by 1000 articles randomly extracted by the general dataset regarding elderly/senior people and by 1000 articles not regarding elderly/senior people randomly extracted by the newspaper repository; comparing the average values of the index applied to the two subsamples we have checked manually whether the index scores were consistent with the issue we expected their can detect actually; lastly, the list of candidates keywords has been refined both removing those words that resulted to be too generic or misleading.

Of course, this approach based on indices as "bag-of-words" (see on this Di Buccio et al. 2016) can offer some useful insights about how ageing is covered within a technoscientific frame; therefore, what is suggested by the indices had been deepened through a qualitative analysis of the articles more representative (i.e., the articles that received the highest index's scores) in order to check whether the indices actually measures what it was expected to measure.

Regarding the analysis of indices, to have a satisfying number of articles to be analysed and compare the two national trends during the same time frame, we applied the indices to the whole technoscientific dataset considering the 1997-2021 period. Indeed, in the 1985-1997 period, the articles stored in the dataset of *The Guardian*, obtained using the above-mentioned keywords, totalled only 33. This is because of the low total number of articles stored by the British newspaper in its online archive and not to a supposed irrelevance of the considered topic in the UK public debate.

4. Findings and Discussion

4.1 Overview of Italian and UK Press

The general picture we have about media attention to older population is described in Table 1. Even if it is just a first and very general glance, there are some interesting aspects to be outlined.

First, the percentage of articles mentioning older people out of the total articles published in the period under observation is considerably higher in the case of *la Repubblica* (2.67%) compared with *The Guardian* (1.62%); this seems to reflect the greater demographic weight of senior population in Italy, even if media coverage appears to be in a much higher proportion than the difference in the demographic data. In part, this may be because of the fact that, as noted, *The Guardian* database offers a rather small quantity of articles for the first few years; however, this does not seem sufficient to explain the fact that the articles concerning

older people are found to weigh twice as much in the case of *la Repubblica*. In Italy, hence, the elderly show higher attention in the public sphere than in the UK.

Second, we can see a significant difference in the proportion of articles with a technoscientific frame, but this time, the positions are reversed. Although the percentage of technoscientific articles relating to the elderly on the total number of articles related to the elderly generally is equal to 10.43% for *The Guardian*, the ratio is reduced to 6.7% for *la Repubblica*. In the Italian context, therefore, older people are discussed more, but this is done less so within a technoscientific framework, which is quite the opposite in the UK. These data can be interpreted as a preliminary indication of the greater complexity in the UK debate, which is focused on indicating a wide range of technological and clinical solutions to the ageing issues. Obviously, however, this is a very generic clue, which will eventually have to find other supporting elements to be seriously taken into consideration.

Remaining at an exploratory level, the first topic modelling run on the general datasets can offer further introductory indications. As anticipated, the longitudinal study of the topic trends in Italy and the UK has been realised for 40 topics, here focused on a broad range of content domains, which can be summarised as follows:

- **Culture and art** (8 topics both in Italy and 6 in the UK). Older adults are artists, writers and actors/actress, spectators of cultural events (e.g., audiences of TV programmes and movies) or characters that appear in artistic products (e.g., books, movies, paintings);
- **Politics and institutions** (10 topics in Italy and 12 in the UK). Older adults are the recipients of public policies and citizens involved in political life (as leaders, electors, part of trade unions or social movements);
- **Business and economics** (3 topics in Italy and 3 in the UK). Older adults are the targets of new products (e.g., digital technologies) and services (e.g., holiday packages) or managers of big companies;
- **Social and physical vulnerability** (5 topics in Italy and 6 in the UK). Older adults are the victims of crimes, sociopolitical conflicts and meteorological events (e.g., global warming, earthquakes);
- **Sports** (2 topics in Italy and 1 in the UK). In this case, the term "older" is often used as an adjective to describe experienced players or coaches in certain sports (e.g., football and tennis). Sometimes, older adults are spectators of sporting events;
- **Community and everyday life** (6 topics in Italy and 4 in the UK). Older adults are the members of territorial, religious, familiar and ethnical communities participating in their daily life (e.g., as observants of Catholic church or as family members with a certain role);
- **Healthcare** (3 topics in Italy and 3 in the UK). Older adults are "people at risk" of incurring health problems – with particular reference to COVID-19, to which a separate topic is dedicated – and are the recipients of clinical interventions and research, welfare reforms concerning national healthcare systems.

The last 3 topics for *la Repubblica* and 2 for *The Guardian* resulted in a low internal consistency, therefore making it hard to circumscribe clearly the issue of reference.

Hence, if, in general, the public discourse affects older people in many ways, the specific focus on health and medicine occupies a relevant but not overwhelming part of this. This can be considered a first hint about the biomedicalisation of older adults within Western societies.

However, to make the analysis more relevant to our research questions, it was necessary to focus our attention on a dataset composed of articles more directly related to technoscientific issues. For this reason, we applied LDA to a collection of articles that not only have something to do with older people in some way, but that also talk about them with greater reference to technoscience (the so-called "technoscientific dataset").

The longitudinal analysis on the topic trends in Italy and the UK (see Tables 3 and 4, *following pages*) shows that the public debate about ageing and health presents features that are reasonably coherent with the biomedicalisation perspective for which ageing has become a matter of biomedical interest to a great extent.

Emerging topics mainly regard issues that have to do with the health of the older people (15 out 19 in Italy and 16 out 19 in the UK; see Table 3 and Table 4, respectively), and the most of them belong to the domain of well-being and prevention (11 in Italy and 11 in the UK), showing a high public concern about the health conditions of the ageing population, even when full-blown diseases are not discussed.

In the well-being and prevention domain, attention is sometimes focalised on the prevention of certain specific diseases – deemed to be particularly dangerous for older people – through public health campaigns, with particular reference to the flu (topic 10 in Italy; topic 13 in the UK) and COVID-19 (topic 19 in Italy; topics 2, 14 and 15 in the UK). Here, we can observe that public health campaigns have attracted more attention in the UK than in Italy, considering both the number and relative weight of these topics[9]. Regarding this latter aspect, it is because of observations that, in both national contexts, topics dedicated to COVID-19 emerged and that in the UK these topics seem to have had even more relevance in the public sphere; in particular, in the UK, topic 14 concerning restriction measures appears as the sixth topic regarding relevance (see the column "relative weight" in the Table 4).

Other topics, coherently with the processes that characterise the biomedical era, signal that a media discourse "problematise the normal" (Armstrong 1995), supporting the surveillance of the population once judged as "normal" and pushing it to embrace clinical interventions. This can happen in many ways:

- Pathologizing the conditions once considered as nonpathological consequences of ageing processes, that is, memory loss (topic 8 in Italy) and infertility (topic 12 in Italy);
- Transforming individual routines as a matter of clinical concern, see, for example, sleep (topic 2 in Italy), nutrition (topic 3 in Italy; topic 3 in the UK), physical activities (topic 9 in Italy) and living during global warming (14 in Italy; 11 in the UK);
- Surrounding older people with technological infrastructures and interventions aimed at enhancing their capabilities. The UK press pays particular attention to the role of digital innovation and robotics in allowing senior citizens to improve their daily lives, supporting them in communication (topic 10) or mobility (topic 6). In Italy, only one topic (11) focuses on the role of territorial innovation in improving the quality of life of older people;
- Giving the floor to the ongoing research on ageing mechanisms (topic 4 in Italy; topic 12 and 17 in the UK) and the factors that can expand life expectancy (e.g., genetics, lifestyles, received clinical interventions). These topics, although of a limited number, are paramount in the public debate: in particular, in Italy topic 4 and in the UK topic 12 are, respectively, in second and the first position when it comes to relative weight.

la Repubblica

Topics' thematic domain (1)	Topic number and label (2)	Relative weight (3)	Top 5 words (4)	Topic trend from 1985 to 2021 (5)
Wellbeing and prevention	2, Medications, sleep and overall wellbeing	(0,122) 7th	medications, sleep, medication, doctor, effects	
	3, Diet, nutrition and health	(0,103) 9th	diet, vitamin, food, nutrition, fats	
	4, Research about health and wellbeing	(0,369) 2nd	study, researchers, research, results, studies	
	8, Brain, ageing and health	(0,085) 12th	brain, Alzheimer, memory, disease, dementia	
	9, Physical activity and ageing	(0,114) 8th	activity, physical, ageing, body, exercise	
	10, Flu and vaccines	(0,1) 10th	virus, flu, cases, children, disease	
	11, Innovation, territorial development and quality of life	(0,187) 4th	research, Italy, countries, development, Europe	
	12, Bio-technologies and reproduction	(0,051) 14th	animal, animals, dog, dogs, humans	
	14, Weather, warming and health	(0,126) 6th	air, water, temperature, sun, heat	
	16, Risk and prevention	(0,393) 1st	risk, age, women, population, Italy	
	19, Covid-19 and vaccination	(0,086) 11th	Covid, vaccine, vaccines, coronavirus, dose	

la Repubblica

Topics' thematic domain [1]	Topic number and label [2]	Relative weight [3]	Top 5 words [4]	Topic trend from 1985 to 2021 [5]
Treatment of disease	5, Cancer and treatments	(0,084) 13th	patients, tumor, cancer, tumors, disease	
	7, Mental health	(0,084) 13th	children, depression, anxiety, social, sexual	
	15, Clinical advices and diseases	(0,157) 5th	heart, disease, patients, patient, blood	
NHS	0, Epidemiological changes and innovation in NHS	(0,33) 3rd	patients, clinicians, Italy patient, elderly	

[1] General issues to which topics can be connected.
[2] Labels have been attributed manually by the authors on the basis of the most relevant words – see column 4th and of the articles that better represent the topic.
[3] Relevance of the topic and its ranking compared to other topics relevance.
[4] Representing the topic, i.e., probabilistically more related to the topic.
[5] By year.

Table 3.
Topics clustered per thematic domain in *la Repubblica* newspaper; topics relative weight and ranking, top 5 words representing the topic and trends across the 1985-2021 period.

The Guardian

Topics' thematic domain (1)	Topic number and label (2)	Relative weight (3)	Top 5 words (4)	Topic trend from 1998 to 2021 (5)
Wellbeing and prevention	2, Public health in USA	(0,077) 10th	health, public, states, Americans, California	
	3, Diet, nutrition and health	(0,06) 14th	food, water, vitamin, eat, milk	
	6, Digital technologies, robotics and society	(0,087) 8th	technologies, robots, robot, digital, internet	
	9, Pollution and air quality in the worldwide	(0,072) 11th	air, pollution, health, world, countries	
	10, Mobility, innovation and health	(0,072) 11th	city, car, cities, cars, transport	
	11, Climate crisis and health	(0,066) 12th	climate, change, heat, water, temperature	
	12, Research on health and life expectancy	(0,473) 1st	people, study, health, research, age	
	13, Infectious diseases: symptoms and management	(0,085) 9th	flu, virus, cases, disease, people	
	14, Covid-19 and restriction measures	(0,126) 6th	Covid, people, virus, pandemic, cases	
	15, Covid-19 and vaccines	(0,064) 13th	vaccine, vaccines, Covid, people, vaccination	
	17, Scientific research and anti-ageing medicine	(0,026) 15th	brain, cells, body, blood, research	

The Guardian

Topics' thematic domain [1]	Topic number and label [2]	Relative weight [3]	Top 5 words [4]	Topic trend from 1998 to 2021 [5]
Treatment of disease	1, Mental illness, neurological disorders and suicide	(0,139) 5th	people, older, dementia, mental, care	
	18, Contemporary diseases, diagnoses and treatement	(0,118) 7th	cancer, drugs, patients, drug, treatment	
	19, Social innovation and frail populations	(0,261) 4th	social, people, work, working, community	
NHS	3, NHS, care load and crisis	(0,33) 3rd	patients, hospital, NHS, care, hospitals	
	7, NHS and institutional reforms	(0,314) 2nd	care, health, NHS, services, governament	

[1] General issues to which topics can be connected.
[2] Labels have been attributed manually by the authors on the basis of the most relevant words – see column 4th and of the articles that better represent the topic.
[3] Relevance of the topic and its ranking compared to other topics relevance.
[4] Representing the topic, i.e., probabilistically more related to the topic.
[5] By year.

Table 4.
Topics clustered per thematic domain in *The Guardian* newspaper; topics relative weight and ranking, top 5 words representing the topic and trends across the 1998-2021 period.

Therefore, at first glance, the media discourses in UK and Italy seem to be characterised by a problematisation of ageing, here intended as a process that can be explored and manipulated in its entirety or, at least, that brings with itself pathological conditions that can be prevented. Both in Italy and in the UK, there is a high level of attention given to the role of individual routines in treating health risks related to ageing, also if the topics related to this issue seem to be more present in the Italian press both in terms of number and relative weight (see the second point in the above list). These outcomes are consistent with the emphasis on moral responsibility of the individual that characterises the biomedical era. However, at the same time, the UK debate is also characterised by a high attention to the role of public health campaigns in improving the overall health conditions of older people and on the ways through which the environment can be transformed to improve older people's well-being (see the focus on public health issues and campaigns).

Regarding the topics under the domain "treatment of disease", there are some relevant differences between the two national contexts. In Italy, the focus is mainly on the factors at the basis of some diseases common in senior population (topic 7) and on possible clinical treatments (topics 5 and 15). In the UK, only topic 18 focuses on the diagnosis and clinical treatment of diseases related to ageing, while topic 1 faces the issue of suicide (in terms of assisted suicide or suicide prevention), and topic 19 concerns the social policies aimed at supporting the frail population. Also in this case, in Italy there is a higher presence of topics clearly ascribable to the biomedicalisation of ageing, with regard to the ones that promote interventions that can cure diseases associated with old age. It is interesting to observe that, among the topics under the domain "treatment of disease" found in the Italian newspaper, the most relevant is topic 15 (placed at the fifth place for relative weight), in which healthcare professionals give clinical advice directly to the readers, which is again in line with the individual responsibilisation that characterises the biomedicalisation era.

The last domain, "NHS" confirms that, in the UK, there is more attention than in Italy to the role that public institutions can play in the management of older people's health: topic 7 (the second topic for relative weight) and the topic 3 (the third topic for relative weight), respectively, face the problems encountered by the healthcare system and possibility of reforming it. In Italy, only topic 0 faces this issue (score of 3.33; the third topic for relative weight).

To conclude, although with some variations between the two national contexts, topic modelling has highlighted how, in both countries, older adults' health issues are widely problematised, focusing on the role of lifestyle and technoscientific innovation in preventing or treating them.

In the following subsections, we can go deeper in our analysis of elder biomedicalisation, taking advantage of the indices expressly developed to address our RQs, hence tracing the trends followed by media coverage in representing health issues connected with ageing processes in terms of risk and individual duty.

4.2 Framing Older People as Subjects at Risk

The indices "risk category" and "risk factors" are strongly related to RQ1 because they offer the opportunity to observe whether and to what extent old age is framed as belonging to a

risky group of population and how some specific factors can determine these risks. The two indices present steady positive trends in both national contexts in the 1997-2021 period, even if, in Italian press, the regression lines indicate a more rapid growth of framing older people as a "risk category" exposed to more "risk factors", here with a particular acceleration over the past decade. Moreover, although "risk factors" have become more relevant in Italy than in the UK after 2010 (Figure 3), old people as a "risk category" (Figure 2) have appeared more frequently in *la Repubblica* since the end of 1990s.

Therefore, both in Italy and the UK, the growth of the "risk category" and "risk factors" indices appear reasonably coherent with the biomedicalisation perspective, in which ageing is constructed as a medical problem. The trends observed align with the general tendency of media coverage to incorporate changes in biomedical knowledge, illustrating how the analysis and the treatment of health risk is always necessary even in the absence of a full-blown disease (Hallin et al. 2021, 702). In this way, citizens are transformed into "ready subjects for health discourses, commodities, services, procedures and technologies" (Clarke et al. 2010b, 64).

Regarding the rapid growth of considered indices in Italy after 2010 (see both Figure 2 and 3), compared with the slow one happened in UK, this could be explained referring to the intersection between two processes: the stronger decrease of government health expenditure due to the crisis and the rapider ageing population process (see the section "Methodological Framework and Empirical Contexts"). As previously noted (Briggs and Hallin 2007), the introduction of issues aligned with the biomedicalisation era into the media sphere, including a clear emphasis on individual health risks and on their management, is closely linked to the rise of neoliberal arrangements in healthcare. We can reasonably assume that, within a context already characterized by a significantly heightened ageing population, the sudden rise of public attention to the health risks of older people is some way linked to the harsh impact of economic crisis on Italian National Healthcare System and associated acceleration in neoliberal politics (Giarelli and Neri 2020).

A last remark regards the influence of the COVID-19 pandemic on the considered indices, thus addressing RQ3. Both in Italy and the UK, the "risk category" (Figure 2) and "risk factors" (Figure 3) peaked during 2020, the year in which the COVID-19 virus was discovered. As predictable, the widespread discussion of a virus framed by experts (i.e., statisticians, epidemiologists) and politicians as a "disease of the elderly" (Zhang and Liu 2021) has favoured a clear increase in public attention to the risks that mark old age. As argued by Crabu and colleagues (2021), the COVID-19 pandemic has been characterised by the transformation of medical knowledge into a subsidiary body of knowledge to be mobilised in the public sphere for legitimising the expansion of a political centralised governance of the emergency. Consequently, COVID-19 has promptly attracted a great deal of media attention, ceasing to be a simple healthcare issue and becoming also a social, political and economic one. In 2021, this attention seems to partially decrease: the "risk category" values decrease in both national contexts while remaining higher than in the pre-pandemic period; on the contrary, "risk factors" values grow again (although slightly) in *la Repubblica* articles and slightly decrease in *The Guardian* ones. Compared with the previous years, it seems that COVID-19 strengthened the framing of older people as a risk category and increase the relationship between being old and being exposed to health risk factors because those related to COVID-19 are mainly relevant for aged people.

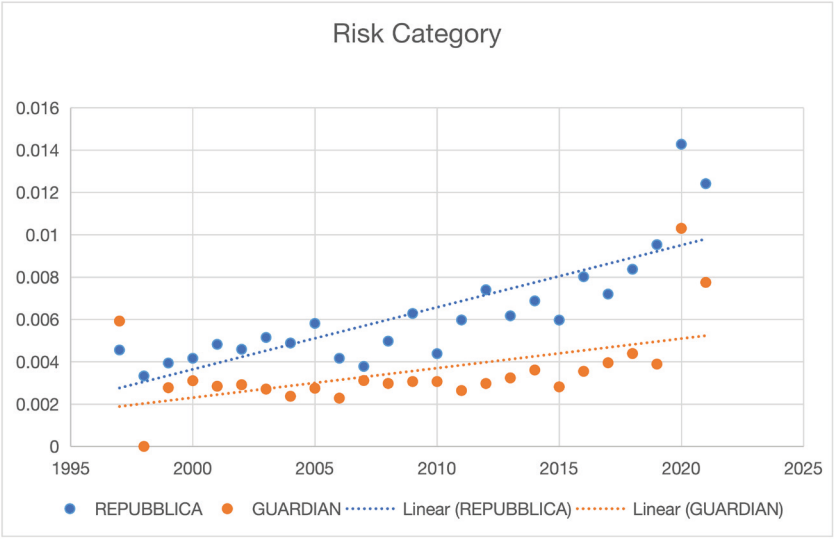

Figure 2.
"Risk Category" index trend (1997-2021) in *la Repubblica* and *The Guardian* (related to RQ1 and RQ3).

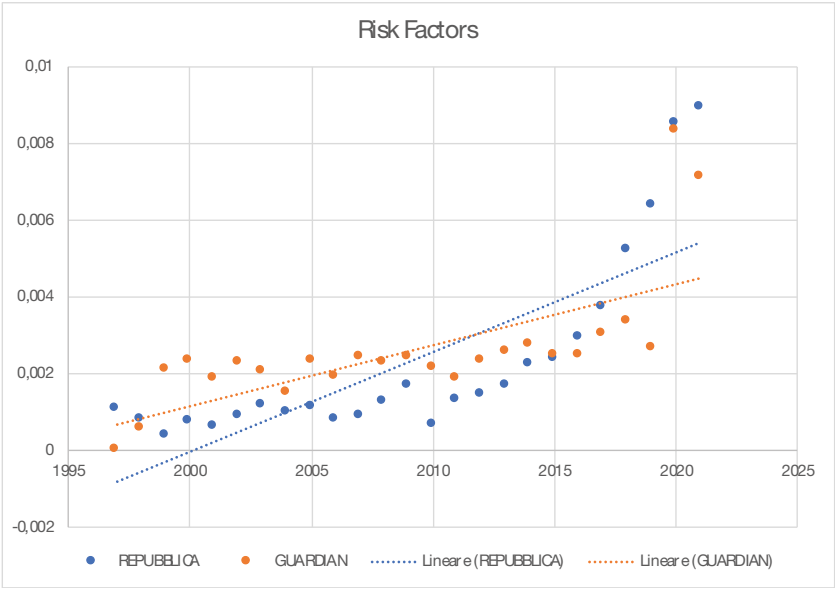

Figure 3.
"Risk Factors" index trend (1997-2021) in *la Repubblica* and *The Guardian* (related to RQ1 and RQ3).

4.3 Treating Ageing Through Technoscience: A Focus on Lifestyles Interventions and Personalised Medicine

The indices "lifestyles" and "personalised medicine" are related mainly to RQ2, given that they regard the ways through which people can adopt technoscientific interventions with the aim of improving their health. These indices, once applied to the articles concerning older people, show the high attention of the public sphere to the use of technoscience for treating those conditions associated with ageing. The "personalised medicine" index follows a positive trend in both newspapers over the years (Figure 4): at the beginning, the values were generally higher in *The Guardian* articles, showing a turnaround during the 2010s. In contrast, the index "lifestyles" shows a slightly decreasing trend in *The Guardian* articles and strong positive trend in *la Repubblica* ones (Figure 5): during the considered period, the two regression lines progressively tend one towards the other. In both cases, the indices in *la Repubblica* show rapid growth, and in this case, their values seem to have accelerated over the last decade.

Regarding the "personalised medicine" index, the positive trends found in both newspapers mirror the growth of in the popularity of these forms of intervention that took place since the late 1990s, as already mentioned (see Figure 4). Through this index, we have measured what Prainsack and Naue have suggested (2006) based on qualitative observations, that is, the growth of popularity of personalised medicine has manifested itself in (and has been shaped by) a considerably larger number of scientific and nonscientific publications regarding the breakthroughs and developments of this innovative strand of clinical interventions.

Concerning the differences between national trends, at first glance, we can observe that, since 2005, the values of this index in *la Repubblica* have started to overcome those of *The Guardian*. Since previous studies have shown how media coverage of health is particularly dependent on knowledge produced by expert sources in the field of medicine (see Hallin et al. 2021, 701), the earlier involvement of British scientific and clinical institutions into personalised medicine, which culminated in the development of public healthcare services based on the principle of personalisation (Cribb and Owens 2010), can explain the initial higher values shown by the considered index in *The Guardian*. In contrast, the rapid rise of public attention in Italy around this issue can be interpreted as connected with the greater space given by the Italian debate, compared with British one, to the individuation of the factors at the core of the diseases associated with old age and the formulation of treatments aimed at curing these latter ones. On the contrary, as shown by topic modelling results, UK public attention seems to be split between, on the one hand, the technoscientific solutions typical of the biomedicalisation era and, on the other hand, the focus on public health campaigns and the reorganisation of health and social care services.

Regarding the "lifestyles" index (see Figure 5), the initially higher values in *The Guardian* articles can be easily explained by the strong emphasis on individual responsibility that has characterised British public debate since the middle of the 1980s. As is well known, under the influence of neoliberal economists in the 1980s, the UK was affected by a reduction in welfare state spending and, during this same period, the emphasis on the responsibility of older people to stay fit, active and engaged rose in the public debate. With the progression of population ageing, over the past 30-40 years, policy makers and experts have publicly discussed the opportunity of supporting the involvement of seniors in volunteering activities

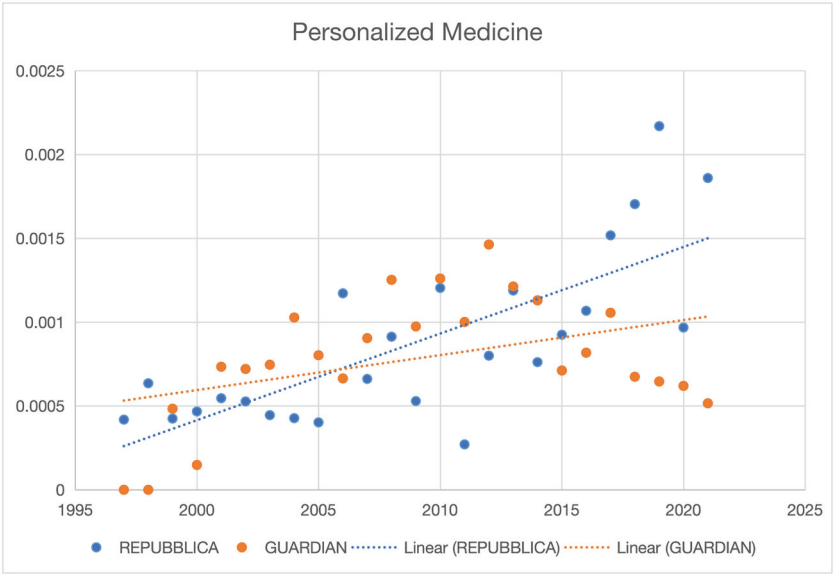

Figure 4.
"Personalized Medicine" index trend (1997-2021) in *la Repubblica* and *The Guardian* (related to RQ2 and RQ3).

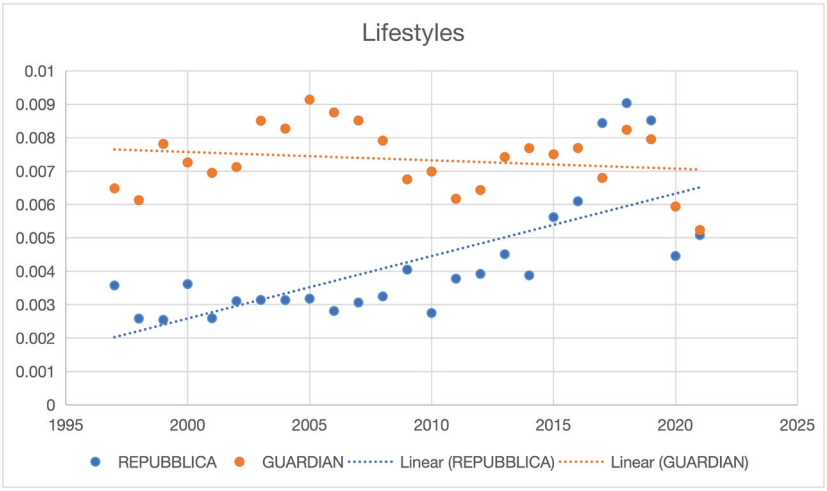

Figure 5.
"Lifestyle" index trend (1997-2021) in *la Repubblica* and *The Guardian* (related to RQ2 and RQ3).

(Lloyd et al. 2014) and providing services and programmes in which they are supported in making health lifestyle choices (see AgeUk 2019). In parallel, concepts such as "third age" (Shimoni 2018) or "active ageing" (Lloyd et al. 2014) have strongly permeated the public discourse. The index's values in *la Repubblica* seem to be much lower than in *The Guardian* for the first part of the considered period, dramatically increasing around the 2010s. This trend can be traced back to the late emphasis on lifestyles in ageing within the Italian public discourse. The concepts of the third age and active ageing in Italy were novel in the early 2000s, and the implementation of policies based on these ideas are quite recent (Palomba et al. 2001; Quattrociocchi et al. 2021). We can hypothesise that, over the last decade, in a national context marked by the pressure of welfare cuts on healthcare services and ageing population, institutions, policy makers and experts, along with newspapers, have increasingly put emphasis on lifestyle choices at the individual level.

Finally, in this section, we can go back to the consequences of the COVID-19 outbreak (RQ3). In 2020, both the "lifestyles" and "personalised medicine" indices underwent a sudden decrease, while the values of two risk-related indices peaked (see Figure 4 and Figure 5). This trend can be explained by the scarce clinical relevance of lifestyles and personalised medicine for the treatment of this virus. Using the distinction of Dickenson (2013), these kinds of interventions are ascribable to so-called ME[10] medicine, which is strongly interwoven with the neo-liberalisation of Western healthcare systems and is focused on the individual responsibility and/or on the role of private companies in the development of technoscientific innovation. In contrast, COVID-19 has given centrality to WE medicine, of which vaccination and, more generally, public health campaigns are typical expression (Crabu et al. 2021). In 2021, the values of the considered indices in the UK continued to decrease, while in Italy they slightly increased. This can be elucidated by the results emerging from topic modelling that indicate how, although in both national contexts topics dedicated to COVID-19 have emerged, in the UK the discussion about vaccination and restriction measures has taken more relevance in the public sphere. These data could suggest a stronger decrease in the attention paid to ME medicine in the UK, favouring the growing importance given to WE medicine that lasts throughout 2021.

5. Conclusions

The comparative analysis over the media coverage in UK and Italy shows that the phenomenon of biomedicalisation of ageing has been taking place over the past few decades, also taking into account that the two European national contexts here considered present some remarkable differences in healthcare system model, in the national cultural model and in the ways in which the ageing population has arisen.

We can now come back to the initial research questions, using both the results coming from topic modelling (period 1985-2021) and analysis of the indices (period 1997-2021).

Regarding *RQ1 – To what extent over the last years has media coverage conceived ageing as a medical problem that brings with it specific risks?* – both in Italy and the UK, a growing problematisation of the health conditions of older people seems to have taken place. The topic modelling analysis has underlined how, in the two national contexts, older people have been

interested in a problematisation of normality (Armstrong 1995), in which their bodies, daily routines and living spaces have become matters of clinical concern. From the analysis of "risk category" and "risk factors" indices, it has been possible to clearly outline how the attention around health risks connected with ageing has followed a positive trend in both countries, even if growing after 2010 more rapidly in Italy than in UK.

Regarding *RQ2 – To what extent over the past few years has media coverage paid attention to solutions aimed at treating health risks connected with ageing?* – the data underline how, in parallel with the growing problematisation of health risks associated with ageing, the public sphere pays an increasing amount of attention to technoscientific solutions for treating these risks. The topic modelling analysis has highlighted that, both in Italy and the UK, media coverage, here coherently with the expectations of scholars engaged in theorising the biomedicalisation of ageing, has focused on the treatment of diseases typical of old age (e.g., Vincent 2006) and on the role of individual responsibility (e.g., Lassen and Moreira 2014) in managing the health issues associated with ageing. The indices "lifestyle" and "personalised medicine" are initially marked by much higher values in the UK, given the early attention paid by British institutions to personalised clinical solutions and the role of individual responsibility in the maintenance of health status. However, in Italy, the public attention paid to lifestyles and personalised medicine during the past few years seems to reach and overcome the one found in the UK.

Finally, with respect to *RQ3 – To what extent has the COVID-19 pandemic affected the ways in which media represent health risks connected with ageing and its treatment?* – the analysis of indices' trends allowed us to explore the effects of COVID-19 on the public discourse around the older people. In both countries in 2020, the pandemic has caused a peak of attention on health risks of older adults and, at the same time, has negatively affected the importance of lifestyles and personalised medicine in the public sphere. In 2021, despite a partial setback, in both countries, the level of attention around health risks of the aged population remained higher than in the pre-pandemic period; in parallel, in Italy, there was a return of attention to lifestyles and personalised medicine, while, in the UK, the attention around these two technoscientific solutions continued to decrease. In the UK, here in a more permanent way than in Italy, the pandemic seems to have weakened the emphasis on so-called ME medicine, here in favour of the various forms of WE medicine (see Dickenson 2013).

Conducting a comparative analysis between contexts that present some remarkable differences has been useful not only for understanding if biomedicalisation of ageing has taking place in public discourse, but also for exploring its interconnections with broader processes. This interpretative effort has been necessary since, following Hardy et al. (2004, 20), "to understand the constructive effects of discourses, researchers must locate them historically and socially". Through our work, we have shed light on the intersections between, on the one hand, newspaper coverage on health issues related to ageing and, on the other hand, changes happened in attention paid by experts and institutional actors to this topic, ageing population and healthcare system arrangements. In the considered contexts, the two key dimensions that compose the "biomedicalisation of ageing" (i.e., social construction and the praxis of ageing as a medical problem; Estes and Binney 1989) have been emerged and evolved along with the just mentioned broader changes. In the period under scrutiny, these interconnections have been particularly appreciable in Italy, a context in which the cuts of public welfare

spending and the weight of older people in the demographic composition of the population, have rapidly and strongly taken place. Moreover, Italy has been characterized by a delayed yet apparently uncontested focus on technoscientific interventions associated with the biomedicalisation era in institutional documents and in the media sphere. In contrast, in the UK, public attention seems to be divided between the emphasis on new technoscientific solutions and the potential of public health campaigns in addressing health risks associated with ageing.

Therefore, it is reasonable to argue that diverse social, political, and cultural processes have contributed to co-producing the trends identified in our analysis. The considered newspapers are active part of this co-production process, influencing the dissemination of perspectives and priorities aligned with government policies and expert sources. Given the quantitative approach adopted in the paper, we cannot fully understand how the specific logics and norms of journalists and the news media shape the representation of health, filtering and reformulating those generated by other actors. We believe that future qualitative or mixed-methods studies could delve deeper into this aspect, taking inspiration from previous works on similar topics (e.g., Fowler and Gollust 2015; De Dobbelaer et al. 2017; Figenschou and Thorbjørnsrud 2018).

Notes

[1] This term is generally used to circumscribe an interdisciplinary field of studies with the common aim of probing how scientific discovery and its technological applications link up with other social developments in law, politics, public policy, ethics and culture.

[2] Currently, the term "personalised medicine" is often substituted with that of "precision medicine". Both are used to describe a clinical approach aimed at identifying the most effective treatments, taking into account the genetic and genomic information, environment, life context and lifestyle of each individual. Some authors prefer the use of the second term because it would allow for a focus on the most recent forms of tailored clinical interventions. In this case, we prefer the first term because it embraces the new and the old kinds of clinical intervention based on individual characteristics, being more suitable for a longitudinal study on the entrance of this field in the public sphere.

[3] The World Bank data: https://data.worldbank.org/indicator/SH.XPD.GHED.CH.ZS. Extraction date: May 25, 2022.

[4] The old-age dependency ratio is defined as the number of individuals aged 65 and over per 100 people of working age defined as those at ages 20 to 64.

[5] The old-age dependency ratio is defined as the number of individuals aged 65 and over per 100 people of working age defined as those at ages 20 to 64.

[6] LDA is a topic modelling algorithm, that is, a machine-learning technique that aims to discover patterns of words in very large document corpora. Given a corpus as the input, a topic modelling algorithm provides as output a set of "topics", each of which is a group of related words, for example, involving the same thematic issue. Probabilistic topic models assume that each document in a corpus is generated by a set of topics, each of which is a probability distribution over the entire vocabulary (the entire set of distinct words occurring in all the documents in the corpus). See Blei et al. (2003; 2009).

[7] The approach has been developed within the Technoscientific Issues in the Public Sphere (TIPS) project and implemented in a web-platform devoted to performing media analysis for social sciences.

The web platform is described in Cammozzo et al. (2020), and the details on the machine learning techniques have been adopted in this paper, for example, text classifiers and topic modelling algorithms, are reported in Di Buccio et al. (2022).

[8] The general formula for the index is:

$$\mathrm{I}(d) \;=\; \frac{1}{|W|} \sum_{w \text{ in } W} \frac{TF(w,d)/B}{TF(w,d)/B + K}$$

where *I(d)* denotes the index value for document *d*; *W* is the set of keywords; *TF(w,d)* is the frequency of the keyword *w* in document *d*; *K* is a parameter (in our analyses, it is set to 1.2); and *B* is a document normalisation factor that includes the document length. This formula is based on one of the components of the BM25 weighting scheme (Robertson and Zaragoza 2009) for ranking documents in IR. A detailed description on how to compute the index can be found in Di Buccio et al. (2016).

[9] The "relative weight" is a probabilistic measure that corresponds to the probability of each topic of reproducing the set of words making up the entire dataset.

[10] With the terms WE medicine, Dickenson (2013) wants to distinguish two counterposed forms of medicine. The first one is more recent, it is deeply interwoven with neoliberal ideology, it is tailored on individuals, and it is generally provided by private corporation directly to the consumer (e.g., personalised medicine). The second one invokes an ethos of public health and notions of mutuality and solidarity, finding, in recent times, a strong resistance also by Western populations (e.g., vaccines).

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