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Changing frames of obesity in the UK press 2008–2017

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ABSTRACT

Obesity is a persistently newsworthy topic for the UK press and in recent years levels of coverage have increased. In this study, we examine the ways in which obesity has been framed by the press over a ten-year period (2008–2017), focussing both on areas of stability and change. The analysis is based on a ~36 million-word database of all UK newspaper articles mentioning the words 'obese' or 'obesity' published within this time frame and draws upon techniques from corpus linguistics – a collection of computational methods for examining recurrent linguistic patterns in large bodies of language data. Our analysis shows that, over time, obesity is represented increasingly as a biomedical problem that is both caused and should be prevented by individual action. Meanwhile, focus on wider environmental determinants of health, including the role of Government and the food industry, decreases over time. In the paper, we situate these trends within the wider context of UK society and argue that they both represent the increasing dominance of neoliberal models of health but also have the potential to contribute to weight stigma and the blaming of individuals. Accordingly, it is argued that the press should seek greater balance in its reporting of the potential causes of and solutions to obesity, as well as closer alignment with scientific evidence. By doing so, the press could begin to report on obesity in a way that raises useful public awareness around the topic and which challenges some of the stigma that currently attends to this social justice issue.

1. Introduction

The starting point for this paper is that language can shape the ways in which matters pertaining to health and illness are experienced and understood by society. As Fox (1993, 6) asserts, 'illness cannot be just illness, for the simple reason that human culture is constituted in language […] and that health and illness, being things which fundamentally concern humans, and hence need to be "explained", enter into language and are constituted in language, regardless of whether or not they have some independent reality in nature'. The discursively constituted nature of health-related concerns is perhaps most pronounced, or at least most evident, in the case of contested diseases.

In this sense, our understanding and experience of contested health issues like obesity are based not just in their so-called biological 'realities' but, crucially, in the language used to talk about them, including in (print) media portrayals (Seale, 2003). In the United Kingdom (UK), the free press plays a major role in influencing the social, cultural and political direction that the country takes by both reflecting and influencing the opinions of readers (van Dijk, 1991). Experimental evidence suggests that different media frames of obesity (i.e. the ways news articles construct the 'problem', affected groups, drivers and solutions) lead to different ways of assigning responsibility for solving obesity and support for different policies (e.g. Barry et al., 2009; Barry et al., 2013; Gollust et al., 2013; Liu et al., 2019). When creating news stories, journalists and editors make choices regarding not only what to write but also how to write about it. The language of news stories thus prioritises certain perspectives on an issue over others, prompting Richardson (2004, 227) to describe journalism as an 'argumentative discourse genre' and Delli Carpini (2005, 50) to observe how 'news gathering and reporting necessarily involves choices that inevitably affect how issues are framed for the public'. Through repeated representations (linguistic choices, images, etc.) of an issue like obesity, the media can therefore have a long-term influence on audiences and the ways they perceive that issue, which is compounded over time (Gerbner et al., 1986).

Due to the rise of online news outlets in recent years, the sales of traditional print newspapers have been in decline. For example, in 2008 *The Sun* was the UK's best-selling newspaper, with an average daily

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circulation of 3,209,766 (Press Gazette, 2008). Yet by 2017, this figure had decreased to 1,666,715 (Ponsford, 2017). However, Conboy (2010, 145) has noted that newspapers have adapted by incorporating online versions, whose readers can easily out-number those who buy the paper copies. For example, *The Sun*'s website had 5.4 million daily unique browsers in 2018 (Tobitt, 2018). Any large-scale exploration of the 'national conversation' around a topic can thus still benefit from an examination of how it is framed by the press. To this end, we examined how discussion of obesity has changed in the press over a 10-year period (2008–2017). Initial analysis indicates that this topic has grown in popularity, with around twice as many words of text in news articles about obesity published in 2017 compared to 2008. However, in this paper our goal is not to show that the topic has increased in discussion but to consider whether the contexts in which it was written about have also changed. Many studies of the press use samples in order to extrapolate trends. However, our approach is somewhat different, employing a dataset, or *corpus*, consisting of every national UK press article containing the words *obese* or *obesity* between 2008 and 2017 (inclusive). Our analysis uses techniques from corpus linguistics, an approach which utilises computer software to identify recurrent or statistically salient words and linguistic patterns in a large collection of naturally occurring texts (the *corpus*, plural *corpora*) (McEnery and Hardie, 2012). In the present study, this enables us to identify how obesity has been framed by the press across the time span covered by our corpus.

2. Background

2.1. Framing

The roots of framing theory can be traced to Bartlett's (1932) classic work in psychology in the 1950s (see, e.g., Bateson, 1955), but the current popularity of framing theory in media and communication research is largely owed to Entman's (1993) seminal definition of framing. Framing refers to selecting aspects of a perceived reality and making them more salient in a text 'in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation' (Entman, 1993, 52). While framing is an active and strategic process, frames are the more static 'interpretative packages' that become embedded in news articles at the production stage and can be subsequently reconstructed by researchers through text analysis (Entman, 1993; Gamson and Modigliani, 1989). Frames explain complex issues by lending more weight to certain considerations and activating schemas that encourage people to think in particular ways (Chong and Druckman, 2007). A frame is thus an organising principle (Reese, 2001) or a central organising idea (Gamson and Modigliani, 1989) that enables individuals to make sense of issues by turning 'meaningless' aspects 'into something meaningful' (Goffman, 1974, 21–22).

Apart from being one of the most popular theories in media and communication research (e.g. Bryant and Miron, 2004; Vliegenthart, 2012), framing theory has also been influential in research into the social representation of health and illness (e.g. Kreps, 2009) and it is among the most influential frameworks applied to the analysis of obesity reporting in the news (Atanasova et al., 2012).

2.2. Obesity frames in the news

Existing scholarship has identified three main recurrent frames of obesity in the news: an individual lifestyle frame, a biological/medical/scientific frame and a societal frame. Studies generally find that the most common approach in the news is to frame obesity in terms of individual lifestyle. This individual lifestyle frame views people as ultimately responsible for the causes and solutions of obesity where physical activity and food consumption are the focus (e.g. Atanasova and Koteyko, 2017; Holmes, 2009; Lawrence, 2004; Saguy and Almeling, 2005; Shugart, 2013). Such a stance provides little impetus for governments and businesses to acknowledge health contributors beyond individual behaviour and allows for blame and proposed solutions to burden and stigmatise individuals. Empirical research shows that people with obesity experience this type of individualised reporting in the news as encouraging a culture of weight bias and stigma, making it more acceptable for others to publicly ridicule them (Couch et al., 2015).

The term 'stigma' broadly refers to a 'spoiled identity' (Goffman, 1963). Some of the earliest work on stigma was carried out by Durkheim (1895), who viewed stigma as both unavoidable and relative, envisaging that even in a perfect society with no crime, 'venial faults' would create scandals and that if such societies were able to judge and punish, they would define such acts as criminal. Falk (2001) argues that stigmatisation occurs because it helps to create group solidarity, helping to distinguish between insiders and outsiders. While people possess a multitude of identity variables, it is the stigmatised ones which tend to be noticed first (Becker, 1963: 33-4). Epstein (1998: 145) claims that stigmatised identities are thus likely to subsume other aspects of identity so that the behaviour of a stigmatised person is likely to be attributed to aspects of their identity that are stigmatised.

People are sometimes able to conceal aspects of their identity that are stigmatised (for example, in homophobic societies gay men and lesbians might claim to be heterosexual) but it is more difficult to conceal obesity. Therefore, a person who is living with obesity is almost always visibly stigmatised and thus discredited. People with visibly larger, adipose bodies are liable to experience stigma on the grounds that they are likely to contravene society's 'thin ideal' (Rich and Evans, 2005). This type of stigma is widely referred to as 'weight stigma'. People with obesity are particularly vulnerable to stigma in societies in which they are framed as being personally responsible for their condition.

Weight stigma, particularly that propagated by the media, has been found to adversely impact the lives of people with obesity, both in the sense that it can cause them to internalise shame but also because it can influence the ways that they are perceived within society. A 2020 survey on obesity attitudes in the UK by Novo Nordisk (cited in Obesity UK, 2020) reported that 58% of people with obesity find coverage of it in the media to be negative, while 60% would like to see it improved. Meanwhile, two-thirds of the general public view obesity as a lifestyle choice, while a quarter believe that people with obesity are selfish and lack self-control. The same survey showed that such perceptions can also tangibly harm the life chances of people with obesity, as around a third of people were reported as believing that people with obesity are less effective at work compared to people perceived to be a 'healthy weight' (Obesity UK, 2020).

Another recurrent frame of obesity in the news is a biological/medical/scientific frame which presents obesity as a biological or genetic disorder caused by genes, viruses and other biological imbalances that are best solved with medical or scientific means (e.g. Atanasova and Koteyko, 2017; Holmes, 2009; Lawrence, 2004; Saguy and Almeling, 2005). This view of obesity has been overall welcomed as potentially less stigmatising of people with obesity – if the causes of obesity are outside of self-control, individuals cannot be blamed for their condition (Saguy and Almeling, 2005). Some research has, however, found that news articles which promote a biological/medical/scientific frame are not devoid of blame and stigma, as the inefficacy of medical treatments tends to be attributed to a lack of individual perseverance (Atanasova and Koteyko, 2017).

Obesity has also been framed as a matter of societal responsibility highlighting the role of government, industry, education institutions and, generally, wider societal forces in creating obesity-inducing environments (e.g. Holmes, 2009; Lawrence, 2004). This frame of obesity alleviates some of the stigma associated with the other approaches.

Many of these studies emphasise the high volume of obesity-related coverage in the news, which also tentatively explains the relative lack of longitudinal examination of obesity portrayal. While such studies do

exist, they tend to focus on specific populations (e.g. child obesity in Barry et al. (2011), Nimegeer et al. (2019) and van Hooft et al. (2018)) and national contexts that are different to ours (e.g. obesity in US news in Kim and Willis (2007) and Lawrence (2004)). In focussing on longitudinal patterns in the framing of obesity by the UK press, then, the present study will provide a fresh perspective on a context that has hitherto received scant analytical attention.

This does not mean to say, however, that obesity framings or representations have not been studied in terms of a change-over-time perspective, as Hilton et al. (2012) examined changes to the framing of the 'obesity epidemic' in seven UK newspapers over a fifteen-year period (1996–2010). Using manifest content analysis, their study revealed an increase in the amount of media reporting of the obesity epidemic during this period with a notable increase in the focus on childhood obesity in particular. These authors also reported a shift in focus *away* from the roles and responsibilities of the individual and *towards* the role of societal solutions such as regulatory change.

The present study seeks to expand upon this and other previous studies in several ways. First, the data we analyse is more contemporaneous than Hilton et al.'s comparable longitudinal study (which ran to 2010). Second, while Hilton et al. examined the changing frames around the 'obesity epidemic' specifically, we take a broader view by examining the framing of obesity more generally (i.e. not just in the context of the metaphorical 'epidemic'). Finally, while previous studies (including all of those cited above) have adopted content and thematic analytical approaches, the present study is the first to apply (corpus) linguistic techniques in the longitudinal analysis of media representations of obesity. This means that the present study will provide, to our knowledge, the first examination of the ways in which obesity representations have changed over time that focuses not just on content (i.e. *what* is said) but also form (i.e. *how* it is said). Yet this does not mean to undermine previous research on this topic, as this body of work, and Hilton et al.'s study in particular, provides a useful set of findings against which we can compare our own in order to evaluate changes to frames in the decade since Hilton et al.'s analysis was carried out.

3. Methodology

This analysis was based on a purpose-built corpus comprising UK national press articles containing the words *obese* or *obesity* during the 10-year period 2008–2017 (inclusive). This period represents the 10 years leading up to our point of data collection but also provides the most up-to-date perspective on obesity coverage (by comparison, Hilton et al., 2012 considered obesity coverage between 1996 and 2010). Articles were collected using the online news archive, *LexisNexis*, which archives both online and print versions of newspapers. To avoid skewing frequencies, duplicate articles from the same newspaper were removed. Table 1 shows the 11 newspapers used in the study[1], along with the amounts of data that each contributed to the corpus.

Table 1
Breakdown of the corpus by newspaper.

Newspaper	Articles	Words	Mean article length (in words)
Guardian	5008	5,238,062	1046
i	1199	617,466	515
Independent	3137	2,685,803	856
Mail	12,805	11,890,340	929
Mirror	3398	2,202,323	648
Morning Star	152	63,641	419
Sun	2286	1,082,808	474
Star	1072	370,818	346
Telegraph	5,680	4,804,351	846
Times	3948	3,831,868	971
Express	5193	3,265,741	629
Total	**43,878**	**36,053,221**	**822**

As this table shows, the corpus does not contain equal amounts of text from each newspaper. One newspaper, the *Mail*, comprises around 30% of the words in the corpus, while the contribution of the *Morning Star* is marginal. Average article length also varies considerably, with the *Guardian*'s average being more than double that of tabloids like *The Star* and *The Sun*. Our analysis here does not compare newspapers separately but instead considers change over time across the whole dataset (we compare and contrast language use between the newspapers in Brookes and Baker (forthcoming)). Here though, we note that our findings should be understood in relationship to the make-up of the corpus.[2] To examine change over time, three phases of analysis were conducted.

In Phase 1, we split the corpus into 10 smaller sub-corpora, each consisting of a year of articles. Fig. 1 indicates the number of words published across each year of the corpus, and so in each annual sub-corpus. A distinction can be made between the period 2008–2011 when interest in the topic appears to have been gradually declining, and the period 2012–2016 which shows a rise in interest, although the fall in 2017 indicates that perhaps the topic has peaked. In any case, the second half (24,049,270 words, 28,677 articles) of the measurement period contains twice as much data as the first half (12,003,951 words, 15,201 articles). Due to this overall rise, the raw frequencies of references to different words are likely to have increased over time. Therefore, for the purposes of this paper, we are more interested in words that have increased the most, in proportion with the increasing number of articles. For example, in 2008, the British press collectively used the phrase

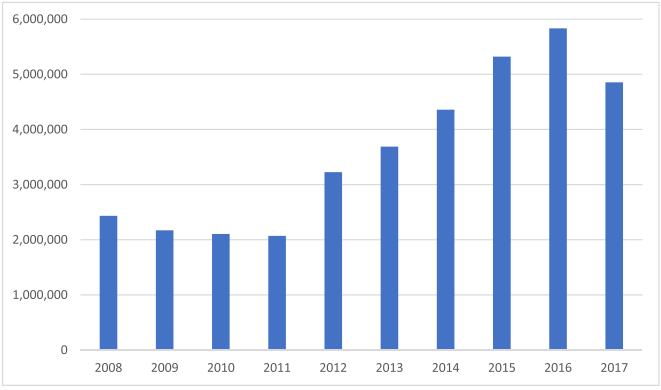

Fig. 1. Number of words published in articles about obesity per year.

[1] We excluded the *Financial Times* due to its more specific focus on finance compared to the other national papers, *The New European* as it did not start publication until 2016, and *Metro* due to the fact that unlike the other newspapers, it is a free newspaper which is mostly distributed to people who use public transport.

[2] Three tabloids, The Sun (1,666,715), Mail (1,511,357) and Mirror (742,888), were the most popular newspapers in the period examined, followed by two broadsheets, the Telegraph (472,258) and Times (451,261) - circulation figures given in brackets for 2017. Baker et al. (2013: 68-9) provide figures on audience distribution of these newspapers by social class. Generally, 50–60% of broadsheet readers of the broadsheets are from social class AB (managerial professional) whereas 60% of tabloid readers tend to be from social classes C1 (lower middle class) or C2 (skilled working class).

obesity epidemic 200 times, with this number rising to 335 cases in 2017. However, in terms of the *proportion* of press discussion devoted to obesity, we should take into account that 2008 saw 2.4 million words of text on the subject, while 2017 saw 4.8 million words. Thus, based on the amount of writing about obesity, the phrase *obesity epidemic* occurred 82.21 times per million words in 2008, but fell to 69.03 times per million in 2017. Obesity may be discussed more as an epidemic, but in terms of the amount of coverage overall, this view is somewhat backgrounded as a result of other, more dominant ways of framing the topic.

Putting aside the issue of there simply being more discussion around obesity in 2017 compared to 2008, within our analysis we also aimed to understand how known media frames around obesity have shifted over time. Do certain topics take up more space at different points, compared to other time periods? To answer this question, our analysis considered the proportional frequencies of the words in the data. Our first step in this process was to identify a set of topics to compare against one another over time. To do this, Phase 2 examined the language contained within the corpus, focussing on 'content words' consisting of nouns and to a lesser extent verbs and adjectives. We wanted to identify the language that was distinctive across the corpus, so we used a technique called keywords. Essentially this approach uses computer software (in this case the online tool, *CQPweb*; Hardie, 2012) to compare the frequencies of words in one corpus against another, called a reference corpus, which usually functions as a linguistic benchmark or standard. Using statistical tests, words which occur with a marked frequency in the first corpus compared against the second are considered keywords. The keywords approach is a popular one within corpus linguistics (see Archer, 2009) and is often used as a way of providing lexical signposts to areas of interest in a corpus (Brookes, 2018).

We derived a list of keywords for each year of the corpus separately by comparing that year against the remaining years combined.[3] For example, we first derived the keywords for 2008 by comparing this period against the period 2009–2017, then we derived keywords for 2009 by comparing this period against 2008 and 2010–2017 combined, and so on. We removed a small number of grammatical keywords, such as *the* and *of*, which did not reveal very much about the content of the corpus, then we took the 100 most frequent keywords from each of the ten years, resulting in a list of 1000 words. Using this method, some words were key in two, three or four years. For example, the word *government* was a keyword for the years 2008, 2009, 2010 and 2016. We only counted this as one keyword meaning that after duplicate keywords were removed the original set of 1000 words was reduced to a list of 745 distinct keywords.

The keywords were then grouped into categories based on the themes or concepts they referred to. While some corpus analysis tools like *Wmatrix* (Rayson, 2008) use thesaurus categories to automatically assign words to thematic or semantic categories, we have found that analyses of more specialised, topic-specific datasets such as ours can be more useful if the analysts develop a bottom-up categorisation system and decide how words should be assigned in line with their research questions. Automatic taggers do not always recognise every word they encounter and often assign categories based on surface meaning, whereas it can be more useful to take into account the contexts in which the words are used. For example, one of the categories we created was ILLNESS, which contained words like *cancer*, *diabetes* and *inflammation*. We included words like *heart* and *liver* in this category, as our explorations of how those words occurred in the context of articles revealed that they almost always referred to heart or liver disease. However, we did not categorise the word *epidemic* as ILLNESS, as instead we found it was almost always used metaphorically to refer to purported increases in rates of obesity, for example:

> High sugar consumption is said to be fuelling the obesity epidemic, which is leading to increased cases of heart disease. (*Daily Mail*, April 2009)

Thus, we created a category called PROBLEM and included *epidemic* alongside words such as *risk*, *crisis* and *problem*, as all four words were used to frame obesity in a negative way. Categorisation was carried out separately by two of the authors at first and then jointly to resolve a small number of disagreements. We should note that we did not speculate about how the keywords in our data were used in order to categorise them. Rather, we closely analysed at least 100 random cases of each of the words to resolve them into categories that best reflected their most typical use (this was a method first adopted in Baker et al. (2019), based on experimenting with different numbers of cases in order to identify an amount which was most effective at identifying the range of contexts that a word can occur in). Where a word had more than one meaning and could appear in multiple categories, we chose the meaning which was most frequent out of the 100 random cases examined. Not all words could be easily assigned to a category as they had a range of frequent meanings or were used in ambiguous ways. For this reason, we did not categorise 131 of the keywords. We then interpreted these semantic/thematic categories in terms of obesity 'frames'. As noted earlier, selection and salience are key to the definition of framing. Since keywords foreground statistically salient language use in the data, this approach can provide a useful entry point for the identification of frames (Atanasova and Koteyko, 2017).

The next step involved identifying the collective frequencies of the words assigned to each category. As noted above, in order to account for the different amounts of data in each year, we compared relative frequencies based on occurrences per million words. In order to narrow our focus, we decided to only consider categories that appeared as least 1000 times per million words in at least one year of the dataset. This resulted in 27 categories being considered, see Table 2.

Most of the semantic domains in Table 2 can be grouped under obesity frames identified in previous studies; namely, an individual lifestyle frame (FOOD, SPORT and LIFESTYLE), a biomedical frame (MEASUREMENT, RESEARCH, ILLNESS, HEALTHCARE, BIOLOGY and MEDICINE) and a societal frame (POLITICS (UK), EDUCATION, BUSINESS, RESPONSE and SOCIAL). However, other domains cannot easily be grouped under a specific frame, such as WEIGHT, QUOTATIVES, PLACES (UK), CHILDREN, WOMEN, PROBLEM, WEIGHT LOSS, TV FILM & ARTS, ECONOMICS, HELP, CAUSES, MATERNITY, PLACES (NON-UK). Instead, these domains tend to relate to news values (Galtung and Ruge, 1965). For example, the prominence of PLACES (UK) can also be linked to the news value of 'geographic proximity' (Harcup and O'Neill, 2017), as locally and nationally unfolding events and issues are believed to be more newsworthy to a domestic audience. Similarly, the category CHILDREN can be linked to a news value called 'human interest' (e.g. Masterton, 2005) while PROBLEM links to the news value of 'negativity'.

4. Analysis: change over time

Table 2 shows large differences in the overall frequencies of the various categories, with keywords relating to FOOD collectively occurring most often (448,536 times), and those relating to SOCIAL issues the least (28,283 times). This is something to bear in mind when we now turn to consider how mentions of categories have changed over time. We plotted linear trend lines for each category over time. Fig. 2 illustrates this for the most frequent category; FOOD, which mostly rises over time

[3] A range of statistical tests can be used to identify keywords. We chose the log-likelihood test (Dunning, 1993), which indicates cases where there is a high confidence that a word is key. This test tends to produce keywords that are reasonably high in frequency and as this provides more coverage of our corpus than low frequency words, we can be more confident in our claims about the data. All the keywords analysed were assigned a log-likelihood score of at least 15.13, which indicates a minimum p value of <0.0001.

Table 2
Main categories of language use in news articles about obesity.

Category	Relation to obesity	Examples of keywords	Total frequency
FOOD	Eating practices that can raise or reduce levels of obesity	*junk, fruit, chocolate*	448,536
MEASUREMENT	Ways of measuring weight	*BMI, stone, weighed*	304,866
RESEARCH	Scientific research relating to obesity	*experts, findings, study*	261,555
ILLNESS	Health issues which result in obesity or are caused by obesity	*diabetes, cancer, heart*	192,146
WEIGHT	Labels relating to weight	*fat, thin, overweight*	180,570
QUOTATIVES	Statements made by relevant social actors relating to obesity	*said, says, told*	169,959
PLACES (UK)	The context of obesity in the UK	*Britain, London, UK*	118,710
CHILDREN	Stories focussing on childhood obesity	*childhood, kids, youngsters*	101,980
HEALTHCARE	The role of healthcare in reducing obesity	*nurse, patients, hospital*	94,031
BIOLOGY	Potential biological causes of obesity	*genes, cells, testosterone*	92,273
SPORT	How physical exercise can reduce obesity	*sport, swimming, exercise*	91,107
WOMEN	How obesity specifically relates to women	*girls, woman, sister*	90,492
POLITICS (UK)	The effect of politics on obesity levels	*government, MPs, political*	90,438
PROBLEM	Obesity represented as problematic	*epidemic, crisis, problem*	72,275
WEIGHT LOSS	Losing weight	*loss, reduce, anti-obesity*	69,439
TV, FILM & ARTS	Representations of obesity in the media	*comedy, magazine, tv*	63,950
ECONOMICS	The financial aspects of obesity	*economic, money, prices*	55,175
EDUCATION	The role of education in raising or reducing levels of obesity	*curriculum, school, teacher*	52,949
HELP	Advice and help to lose weight	*advice, guidance, help*	42,509
BUSINESS	The potential influence of business in causing obesity	*market, profits, commercial*	36,703
LIFESTYLE	Non-food related behavioural choices related to weight	*lifestyle, sleep, tobacco*	33,078
CAUSES	General words indicating causes	*cause, linked, related*	30,106
MATERNITY	The impact of obesity on childbirth	*babies, maternity, birth*	24,611
MEDICINE	The effect of medicine on obesity	*drugs, statins, antibiotics*	34,207
PLACES (NON-UK)	The context of obesity outside the UK	*countries, Europe, America*	48,934
RESPONSE	Collective efforts to reduce obesity	*action, campaign, strategy*	35,716
SOCIAL	How social issues impact on obesity levels	*inequality, unemployment, discrimination*	28,283

although this is not always the case (e.g. there is a noticeable fall between 2016 and 2017). The dotted straight line is a 'best fit' line which tries to take into account all the data points. The line is also represented as an equation $y = mx + b$ for which *m* is the slope or gradient, *b* is the y intercept, *x* is any x value and *y* is any y value. In Fig. 2, the formula is $y = 890.2x+6567.4$, meaning that the slope is 890.2. The further away the number is from 0, the steeper the slope. An R^2 value is also provided for each trend line. This is a number between 0 and 1, and it measures the amount of difference between the measured values and the line that was fitted to them. A low R^2 value (close to 0) indicates that the measurements do not fall in a straight line while a high R^2 value (close to 1) indicates that they do. The R^2 value thus gives an indication of the reliability of the trend line.

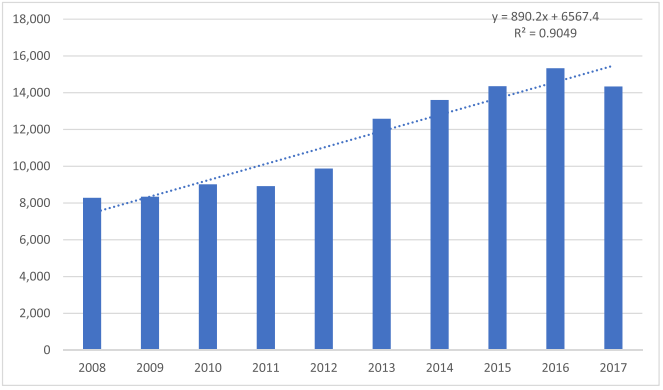

Fig. 2. Relative frequency (per million words) and trend line for the FOOD category over time.

Table 3 shows which trend lines are rising or falling over time for the 27 categories of the keywords examined. Sixteen categories had a positive gradient (shown on the left side of the table) which indicates that the keywords within these categories were generally increasing over time. Eleven categories had a negative gradient (shown with a minus sign), indicating that these keywords decreased over time. We have provided the R^2 values and p values for statistical significance for each slope, to indicate the strength of each trend.

The categories in Table 3 have been presented in order of their gradient or steepness of the rise or fall of their trend line. It should be noted that the categories towards the bottom of each column have very shallow gradients with their trend lines appearing almost horizontal (especially RESPONSE and MATERNITY). These two categories also have very low R^2 values, so the picture for them is more one of fluctuation.

It is important to bear in mind that Table 3 only indicates the changing themes or concepts that are being discussed in relation to obesity in the UK press. It does not indicate the more complex or subtle ways that such themes were discussed and whether they changed. For example, there has been less discussion around the concept of SPORT in relation to obesity over time in the UK press. However, we cannot use Table 3 to make claims about whether the *way* SPORT is discussed has actually changed. It could be the case that in 2008 sport was often mentioned as playing an important role in weight loss but by 2017 this view might have changed and most discussion of SPORT may reflect a view that it is *not* very important for weight loss. To establish any

Table 3
Trend lines indicating rises and falls over time for lexical categories.

Increasing over time			Decreasing over time		
Category	gradient	R^2	Category	gradient	R^2
FOOD	890.2	0.90	PLACES (UK)	−134.00	0.88
RESEARCH	513.68	0.84	SPORT	−128.93	0.41
MEASUREMENT	477.89	0.95	TV, FILM, ARTS	−117.35	0.70
BIOLOGY	458.53	0.94	EDUCATION	−98.16	0.65
ILLNESS	391.12	0.80	POLITICAL (UK)	−94.03	0.35
LOSS	141.63	0.90	ECONOMICS	−63.27	0.64
QUOTATIVES	144.12	0.74	BUSINESS	−43.96	0.72
HEALTHCARE	112.08	0.62	SOCIAL	−33.03	0.76
WEIGHT	107.62	0.43	CHILDREN	−25.83	0.08
NEGATIVE	72.96	0.65	PLACES (NON-UK)	−24.84	0.17
CAUSE	72.72	0.90	MEDICINE	−17.53	0.35
HELP	56.72	0.85			
LIFESTYLE	55.01	0.69			
WOMEN	36.34	0.36			
RESPONSE	6.97	0.04			
MATERNITY	1.37	0.00			

changes in the ways these themes are discussed over the 10-year period, samples were taken at different points to understand whether the role of SPORT had simply decreased or whether it had both decreased and been framed differently.

The charts created for each category occasionally showed outliers, such as Fig. 3 which gives the relative frequencies for the SPORT category. There is an unexpectedly high use of words relating to SPORT in 2012 which was due to the Olympics being held in the UK in this year. Although the trend line for SPORT has a reasonably steep decline (−128.93), the R^2 score for this trend line is relatively low at 0.41, due to the fluctuations in the first half of the corpus. A steep gradient combined with a high R^2 score thus indicates a strong but stable change over time.

Table 3 shows a complex pattern of change in the framing of obesity in the UK press over the 10-year period considered. The shift involves increased problematisation of obesity (PROBLEM), with a focus on its link to poor health (ILLNESS) and its effects on health provision (HEALTHCARE).

> Obesity crisis threatens to increase strokes and heart disease. Obesity rates rising faster in UK than the US. NHS says obese patients will not get surgery until they lose weight. (*Independent*, 28 November 2017)

There is increasing scientific framing of obesity (RESEARCH), focussing on the reasons why people have obesity (CAUSES).

> Obesity awareness may be causing overeating, finds international study. The damage caused by overserving is so great that the government may have to limit how big servings can be or force retailers to charge much more for them in an attempt to reduce consumption, the authors said. (*Guardian*, 14 September 2015)

There is also increased discussion in relation to how people can be enabled to lose weight (LOSS, HELP).

> So, on the advice of her family and friends, Lucy joined Slimming World in July 2012. She says: "I immediately felt welcome and this gave me the confidence and motivation to lose weight. (*Sun*, April 6, 2016)

In addition, there is a very large amount of focus on the types of food that cause or alleviate obesity (FOOD) and other factors related to personal choice (LIFESTYLE).

> Further findings showed participants who skipped breakfast were more likely to have an overall unhealthy lifestyle, including poor diet, frequent alcohol consumption and smoking. (*Express*, October 2, 2017)

The scientific focus also discusses causes related to the way one's body works (BIOLOGY).

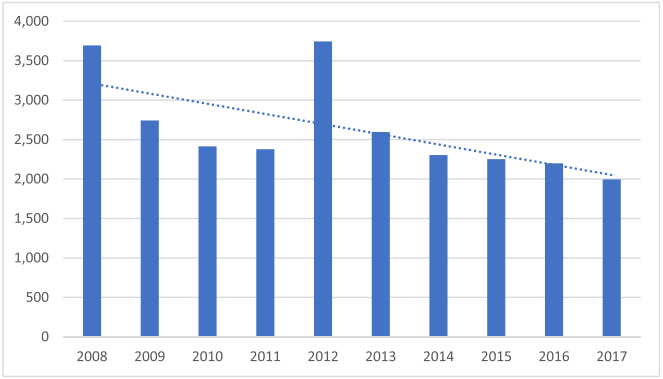

Fig. 3. References to the lexical category of SPORT over time.

> The rise in the number of overweight children in Britain may be as much to do with their genes as their diet and exercise levels, a study has found. (*i*, April 2013)

On the other hand, discussion of the role of food manufacturers has taken up less space in debates around obesity over time (BUSINESS), along with consideration of other economic and social factors like poverty and inequality (SOCIAL, ECONOMIC).

> The link between inequality and obesity is stark around the world: among developed nations, America is the most unequal society and the fattest, with Britain and Australia next on both scores. (*Guardian*, 18 August 2016)

Obesity has been discussed proportionally less as a political issue (POLITICS UK), suggesting that government policy is viewed by the press as less important overall than it once was.

> Theresa May has abandoned plans to tackle childhood obesity by curbing junk food advertising and will instead challenge supermarkets and manufacturers to cut the amount of sugar in their products by a fifth. (*Telegraph*, 18 August 2016)

Childhood obesity has also become less of a central issue to discussion of obesity (CHILDREN), along with consideration of the roles that schools and teachers play in preventing obesity in children (EDUCATION).

> Schools are there to educate, not to act as social workers, health visitors, therapists, nutrition experts or to take on a parent's role. Children have one meal at school and every time teachers check a child's lunchbox and removes an unhealthy snack, the press blames them for being heavy-handed. (*Times*, 4 July 2010)

Related to this is a relative decrease in reference to physical exercise (SPORT) in relation to obesity.

> My children would rather be watching TV than jumping on a trampoline outside. We know less sport contributes to obesity. My sons play football and swim in the week. My husband takes them swimming some weekends, but it's expensive - about 10 for less than an hour. (*Independent*, 3 June 2012)

These findings indicate evidence for the increase of an 'individual lifestyle' framing around obesity in some ways, particularly with the rises in the categories LIFESTYLE and FOOD. Food intake tends to be framed as people making healthy eating choices or dieting as opposed to the regulation of food manufacturers and advertisers or the imposition of taxes. We found that references to food were often couched in terms of disgust with people with obesity described as gorging, gobbling, shovelling or wolfing their food.

> Last weekend in Cornwall I stopped at a deli in Tintagel to eat a pasty, and gawped at the procession of fatties, waddling along the main street licking ice creams and gobbling chips, their thighs chafing with every tiny step. (*Independent*, 16 September 2014)

Additionally, these verbs were sometimes used metaphorically, to describe people with obesity as putting strain on the National Health Service.

> the obese are gobbling up limited NHS services and costing taxpayers more than 55 million a year. How can we change this worrying trend? (*Telegraph*, June 2014)

In other cases, references to food framed people with obesity as being so addicted to food that they would commit crimes.

> Obese woman who went on TV to complain that she was too fat to get a job caught stealing cakes just hours after This Morning appearance (*Mail*, 29 March 2013)

On the other hand, words relating to the category LOSS (which, like FOOD, had become more popular over time), were framed in terms of redemption narratives or success stories.

> She also confessed that she was a serial yo-yo dieter and that her weight would fluctuate up to 13 stone, meaning she had to pick out a size 18 wedding gown last year. But now, after a year at Slimming World, Gemma was able to surprise her loved ones at her wedding this June to fiancé James with her new svelte size eight frame. (*Mirror*, December 2014)

> An obese woman who was ridiculed and bullied for her weight has lost more than 112lbs in just 18 months after her ongoing battle with her body image almost drove her to commit suicide. (*Mail*, 4 October 2017)

However, one way that the individual lifestyle frame has lessened is due to the decreased amount of space devoted to exercise and personal fitness (SPORT). Also, the fact that categories like BIOLOGY, MEASUREMENT, ILLNESS, HEALTHCARE and RESEARCH have increased over time indicates a growing interest in the biological/medical/scientific frame which runs counter to the individual lifestyle frame, instead presenting scientific research which suggests that genetics, the brain, bacteria and hormones all play a role in causing obesity which is implied to be beyond an individual's control. However, the increases in both of these frames indicate that, over time, the causes of obesity are being framed more as a failing of individual rather than societal responsibility (note the falls in POLITICS (UK), EDUCATION, BUSINESS and SOCIAL).

We should not view each of these categories as occupying equal amounts of attention. Table 1 indicates that, in terms of the frequencies of the keywords in each category, words relating to FOOD, MEASUREMENT and RESEARCH were extremely frequent across the corpus, whereas the categories SOCIAL, RESPONSE and PLACES (NON-UK) were much less frequent. FOOD, MEASUREMENT and RESEARCH also show the steepest rises over time, and have very high R^2 scores, indicating that these three categories were already common in the early part of the dataset and have also showed the most impressive and consistent rises over time. The categories SOCIAL, RESPONSE and PLACES (NON-UK) show smaller and less consistent changes over time, and they were not especially frequent concepts. The single strongest pattern of change over time in the dataset, then, is the increased focus on diet; the types and amounts of food that people eat and the relationships between these and obesity. However, this rise does not seem to have resulted in an increase in discussion around government policy or regulation of food manufacturers or advertisers.

5. Conclusion

The current study has shown that the UK press representation of obesity can be increasingly characterised in terms of language which frames obesity from a biomedical perspective, with words encoding themes of RESEARCH, MEASUREMENT, BIOLOGY, ILLNESS and HEALTHCARE becoming relatively more frequent over time. Similarly, quotatives, which have also increased over time, tend to be used to include the perspectives of medico-scientific researchers and medical practitioners. At the same time, words contributing to framings of obesity as a matter of personal responsibility, for example denoting FOOD, weight LOSS and LIFESTYLE, among others, also increased in proportional frequency. The growing biomedical model of obesity, linked to genes, hormones and brain activity, could be viewed as sitting somewhat awkwardly alongside the personal responsibility framing, since it has been argued that the biomedical frame is less stigmatising than the personal responsibility frame because it presents obesity as a condition that has to do with genes, viruses and other aspects outside of individual self-control (e.g. Saguy and Almeling, 2005). However, recent research suggests that newspaper articles adopting the biomedical frame may very well sustain stigma, as such articles have been found to blame the inefficacy of medical treatments on individuals' lack of perseverance (Atanasova and Koteyko, 2017). Our analysis found numerous cases where different frames appeared within the same article and a future research direction would involve an analysis which examines how different frames can be combined and whether this changes over time. Additionally, future research could consider how distinct frames appear across different newspapers and the effect that the combined variables of newspaper and time period have on the frequency of the thematic categories we identified.

Overall, we found that the UK press portrayal of obesity is conflicted. Consistent over time, is that obesity is viewed increasingly as a problem, both to individuals and to the health service, and what the representations of it as a biomedical problem and matter of personal responsibility have in common is that they locate this problem within the individual, as opposed to the wider social and environmental determinants of health. In fact, the frequencies of words indicating a focus on such factors went down over time, with words belonging to relatively infrequent categories like EDUCATION, POLITICS, ECONOMICS, BUSINESS and SOCIAL all becoming less frequent. Thus, the focus of the causes of and responses to obesity is placed on the will and actions of individuals much more than those of more powerful institutions such as the Government and food and drinks manufacturers and marketers. These complementary patterns can be viewed as symptoms of a wider neoliberal rationality which presently governs almost all aspects of social life in the UK (and more countries besides) (Brown and Baker, 2012), not least in matters pertaining to health (Lupton, 1995). Our observation of this general trend supports findings from previous studies of obesity representation in the media which have similarly reported media emphasis on the roles and responsibilities of individuals, often at the expense of considering those of the aforementioned (and other) more powerful social actors; see Atanasova et al. (2012) for a review. Such studies have also recited and elaborated on detailed critiques of the neoliberal approach to obesity and health more generally, pointing, for example, to the potential for such framings to contribute towards victim-blaming and the stigmatisation of people with obesity, as well as to the fact that such approaches are usually unsuccessful because they fail to address the situational factors that contribute towards ill-health but which usually lie beyond the control of individuals (Lupton, 2018).

The present study has provided further validation of those findings, drawing on a more representative and up-to-date body of articles. Yet, the change-over-time perspective adopted here also offers new insight, providing evidence that this neoliberal, responsibilising frame is growing in dominance, with other perspectives increasingly marginalised. This finding runs counter to Hilton et al. (2012), whose analysis of UK newspapers between 1996 and 2010 found that focus was moving away from individuals and towards societal solutions such as regulatory change. Our analysis of a more recent timeframe shows that, unfortunately, this trend has not been sustained.

Accounting for the cause of the individualising trend reported here is difficult, though, and we are forced to hypothesise. One possibility is that neoliberal ideas have become more dominant in UK society over time, and that we might thus expect to find a similar growth in such discourse in the ways that other (health) issues are also reported. Considering the political backdrop against our corpus, for the last three-quarters of our corpus, the UK was led by Conservative policies which included a programme of neoliberal economics, fiscal austerity, welfare and social service cuts. The political climate of the period perhaps helps to explain, to an extent, some of these trends found in the press reporting of obesity. Government policy has been politically conservative, including the implementation and intensification of neoliberal policies and public health initiatives, and while the UK press is politically diverse, most of the newspapers in our sample have been supportive of the Conservative Governments. Thus, we could be seeing evidence of such ideologies being reproduced in the representation of obesity.

Whatever the case may be, what is clear from the UK press is the overall increased discussion of obesity (see Fig. 1), as well as the fact that

it is framed as a growing problem. Further, our finding that the UK press has framed obesity in increasingly individualising terms also means that the aforementioned problems associated with such neoliberal, individualising approaches to public health, and obesity in particular, warrant greater concern today than they did ten years ago. During the period under examination, the percentage of people aged over 16 years who are living with overweight or obesity in the UK has increased from 61% to 64.3% (Baker, 2019). The increased discussion of the causes of obesity in the UK press over this period does not seem to have had much impact on reversing this trend. This would lead us to question whether individualising framings of obesity are helping or harming the national conversation, and whether some of the alternative, minority and declining explanatory factors such as social inequality, government policy and/or regulation of business, would be worth devoting more space to. Despite UK press increasingly focussing on linking obesity to food consumption, this message does not seem to be resulting in weight loss. Unfortunately, we believe that the press's influence around obesity has been to perpetuate a sense of stigmatisation and shame around individuals with obesity, which is held up to be largely their own fault, and to help to divert attention away from the role that powerful social actors (businesses, advertisers, governments) play in contributing to the growing numbers of people with overweight or obesity in the UK. It is particularly ironic that tabloid newspapers like the *Star*, *Sun* and *Mirror*, which emphasise the personal responsibility frame, tend to be read most by people from C2/DE social classes, who are less likely than those from higher social classes to have full control over the types of life circumstances that can contribute to the development of obesity.

If obesity is a 'problem', as the newspapers (and others) increasingly suggest, then perhaps what is required is focus on the causes and responses to it at both the individual and societal levels. However, our analysis has shown that there is a stronger and growing focus on the former. Greater balance in press coverage, incorporating individual and societal perspectives in more equal measure, could help to challenge the stigmatisation and shame surrounding obesity that is pervasive in the UK, and bring about more balanced attitudes and approaches.

The timespan studied in this paper also represents the 10-year period after the publication of the Foresight Report (Butland et al., 2007), a UK Government-led synthesis of evidence about the causes of obesity. That report documented the complex, multifaceted nature of obesity and from the outset acknowledged the role of the media as well as popular stereotypes and oversimplifications that are ill-aligned to scientific evidence and understanding. Indeed, the Foresight Report highlights that many factors that contribute to weight gain are outside or at least partially outside of an individual's control, and that there is a need to challenge the simple portrayal that obesity is an issue of personal willpower. However, the current study's findings demonstrate that since the publication of this report in 2007, the following 10 years of newspaper reporting has predominantly portrayed obesity in relatively simplistic terms, as something that is largely within an individual's control and that is thus a matter of personal willpower. In doing so, such depictions have contributed to widespread weight stigma and the discrimination of people with obesity in the UK. This highlights the lack of alignment between scientific evidence and understanding of obesity and media portrayals of it. A closer alignment between media and scientific evidence, given the potential of the media to reach vast numbers of the population, may go some way to improving public awareness and understanding of obesity and, in doing so, contribute to a reduction in weight stigma and discrimination where simplistic, unevidenced attitudes that lead to blame are at the heart of this social justice issue.

Credit author statement

Paul Baker: Conceptualization; Methodology; Formal Analysis; Writing - Original Draft; Writing - Review & Editing; Project Administration; Funding Acquisition. Gavin Brookes: Methodology; Formal Analysis; Writing - Original Draft; Writing - Review & Editing; Data Curation. Dimitrinka Atanasova: Writing - Original Draft; Writing - Review & Editing. Stuart Flint: Writing - Original Draft; Writing - Review & Editing.

Declaration of competing interest

None.

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