How readable are plain language summaries?

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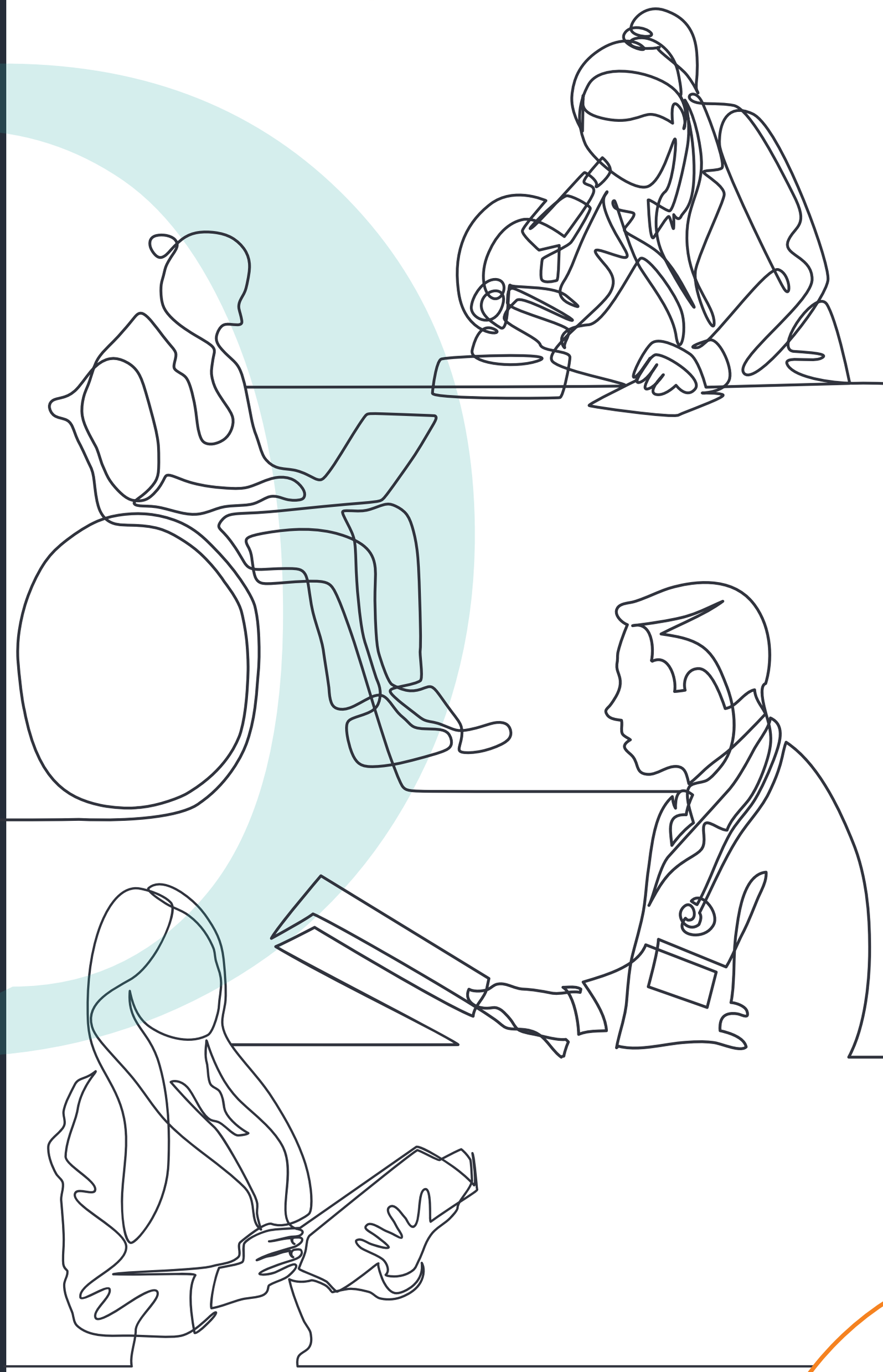
ABSTRACT

Objectives
Plain language summaries (PLS) are important for enabling non-specialist audiences to connect with healthcare and science. Our objectives were to examine the readability of PLS of medical articles and to understand the extent to which readability varies by journal and therapy area.

Research design and methods
We selected scientific journals that publish on varied medical topics and include PLS for different target audiences, ranging from the public to non-specialist scientists. Our data source included the most recent issue of PNAS, PLOS Medicine, Cochrane Reviews and eLife as of August 2020, and issues from August 2019. Articles were reviewed for relevance to medicine and categorised into therapy areas by two medical writers. Using the *Editor* function of Microsoft Word, readability scores of PLS were recorded. As a control for readability of articles aimed at the public, health articles under 600 words from the most accessed online UK newspapers were analysed.[1]

Results
Based on the Flesch Reading Ease score (0, most difficult; 100, easiest), newspaper articles (n=10) were significantly easier to read than PLS (n=136) (median score: 51.5 vs. 30.0; $P<0.05$). Median readabilities of the PLS were 14.6, 24.3, 37.2 and 39.8 for PNAS, PLOS Medicine, Cochrane Reviews and eLife, respectively. The therapy areas with the highest and lowest median readability scores were respiratory (43.9; n=3) and metabolism (2.3; n=2), respectively.

Conclusions
Although PLS of medical articles can have disparate readability scores, they tend to be more difficult to read than newspaper articles. Differences in PLS readability are likely attributed to the audience journals aim to reach. Collaborative efforts could be made to standardise PLS and ensure they are more easily understood.



References
[1]Top 50 United Kingdom (UK) Newspapers. Available at: http://www.onlinenewspapers.com/Top50/Top50-CurrentUK.htm. Accessed September 2020.

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Author contributions: Both authors contributed equally to data collection and abstract and poster preparation.
Disclosures: Tony Ferrar and Emma Conran are employees of Porterhouse Medical Group.

Objectives

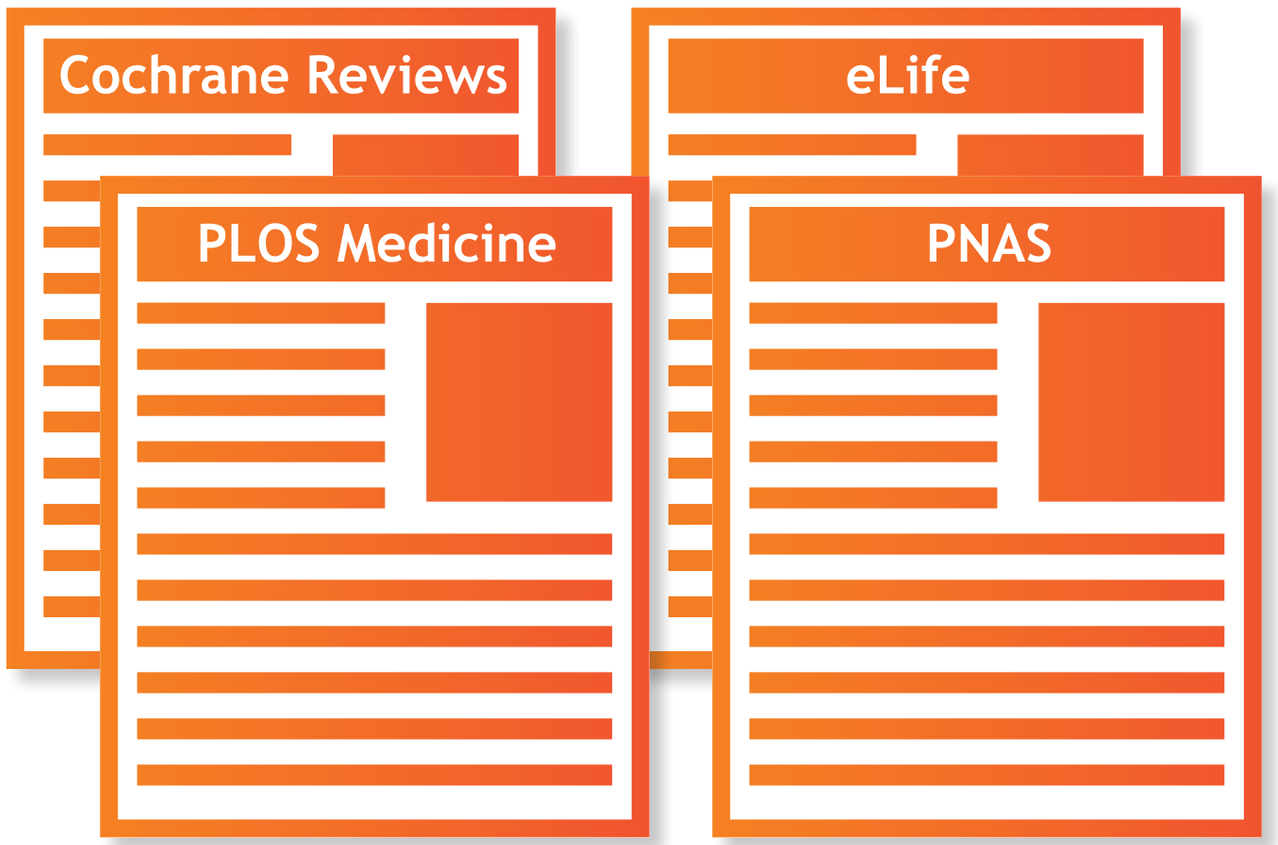
Plain language summaries (PLS) are important for enabling non-specialist audiences to connect with healthcare and science

Our objectives were to:

- **Examine the readability of PLS of medical articles**
- **Understand the extent to which readability varies by journal and therapy area**

Research design and methods

4 scientific journals that publish on varied medical topics and include PLS for different target audiences*

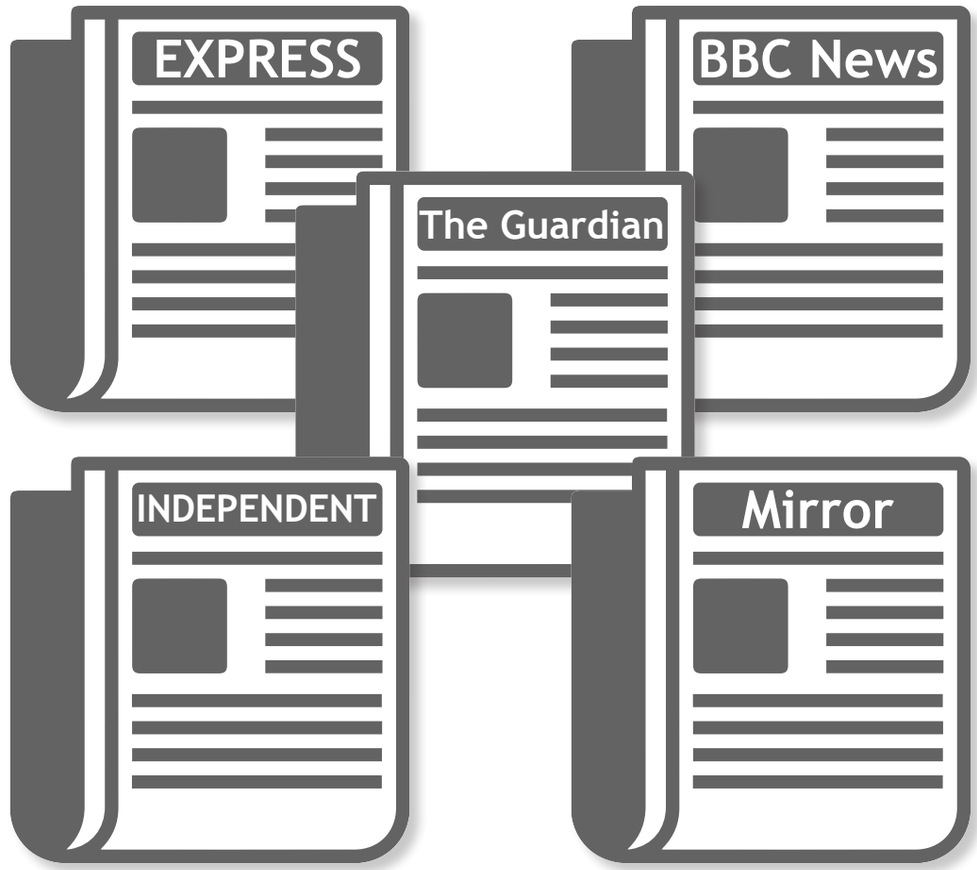


Articles from the most recent issue as of August 2020 and issues from August 2019 were reviewed for relevance to medicine and categorised into therapy areas by two medical writers

n=63 n=53 n=2 n=18

N=136

5 highly accessed online UK newspapers that include a health section



Health articles that were both free to access and under 600 words were selected from issues between September and November 2020

n=2 n=2 n=2 n=2 n=2

N=10

Readability of both the PLS and newspaper articles were assessed using the *Editor* function of Microsoft Word

***We considered significance statements (PNAS), author summaries (PLOS Medicine) and eLife digests (eLife) to be equivalent to PLS.**

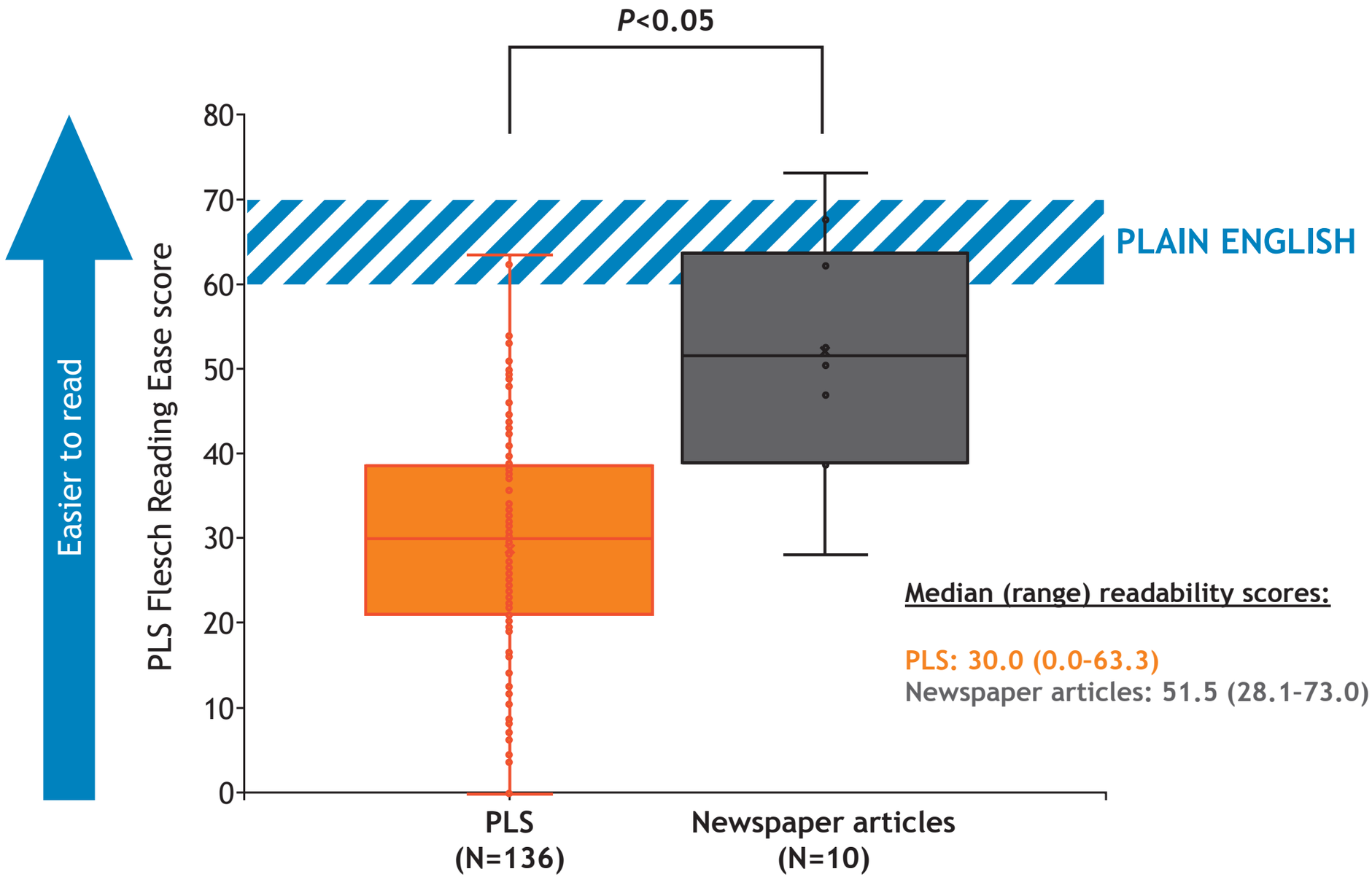
Results

Readability* of PLS vs. newspaper articles

Flesch Reading Ease score[1]

The Flesch Reading Ease score is a measure of how difficult a piece of text is to understand. The score is based on the number of words in a sentence and the average number of syllables per word

90-100: Very easy
80-90: Easy
70-80: Fairly easy
60-70: PLAIN ENGLISH
50-60: Fairly difficult
30-50: Difficult
10-30: Very difficult
0-10: Extremely difficult



Overall, newspaper articles were significantly easier to read (*P*<0.05) than PLS of scientific journals

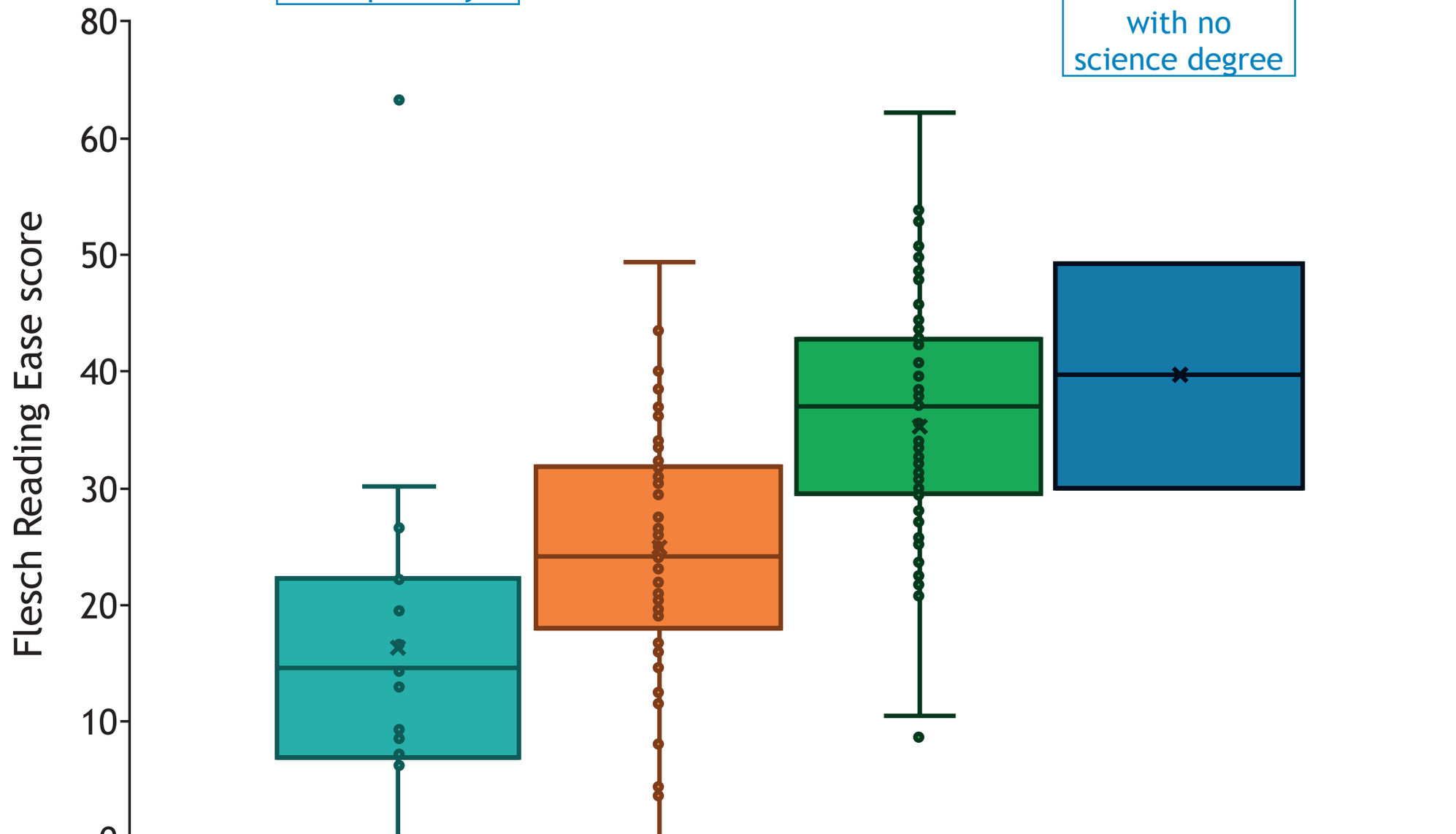
*Readability is defined according to the Flesch Reading Ease score.

[1]How to Write Plain English. Available at: https://web.archive.org/web/20160712094308/http://www.mang.canterbury.ac.nz/writing_guide/writing/flesch.shtml. Accessed December 2020.

Results

PLS readability* by journal

Journal-specified target audience:	Undergraduate-educated scientist outside their field of specialty	Scientists and non-scientists	General population	All backgrounds including scientists, students and individuals with no science degree



	PNAS (n=18)	PLOS Medicine (n=53)	Cochrane Reviews (n=63)	eLife (n=2)
Median (range) readability scores	14.6 (0.0–30.2)	24.3 (0.0–49.4)	37.2 (10.5–62.3)	39.8 (30.2–49.3)
Median (range) word count	123.5 (89–151)	282 (195–492)	472 (217–720)	407.5 (307–508)

Median word count generally increased with readability*

Plotting readability vs. word count for all PLS individually gave an R^2=0.18

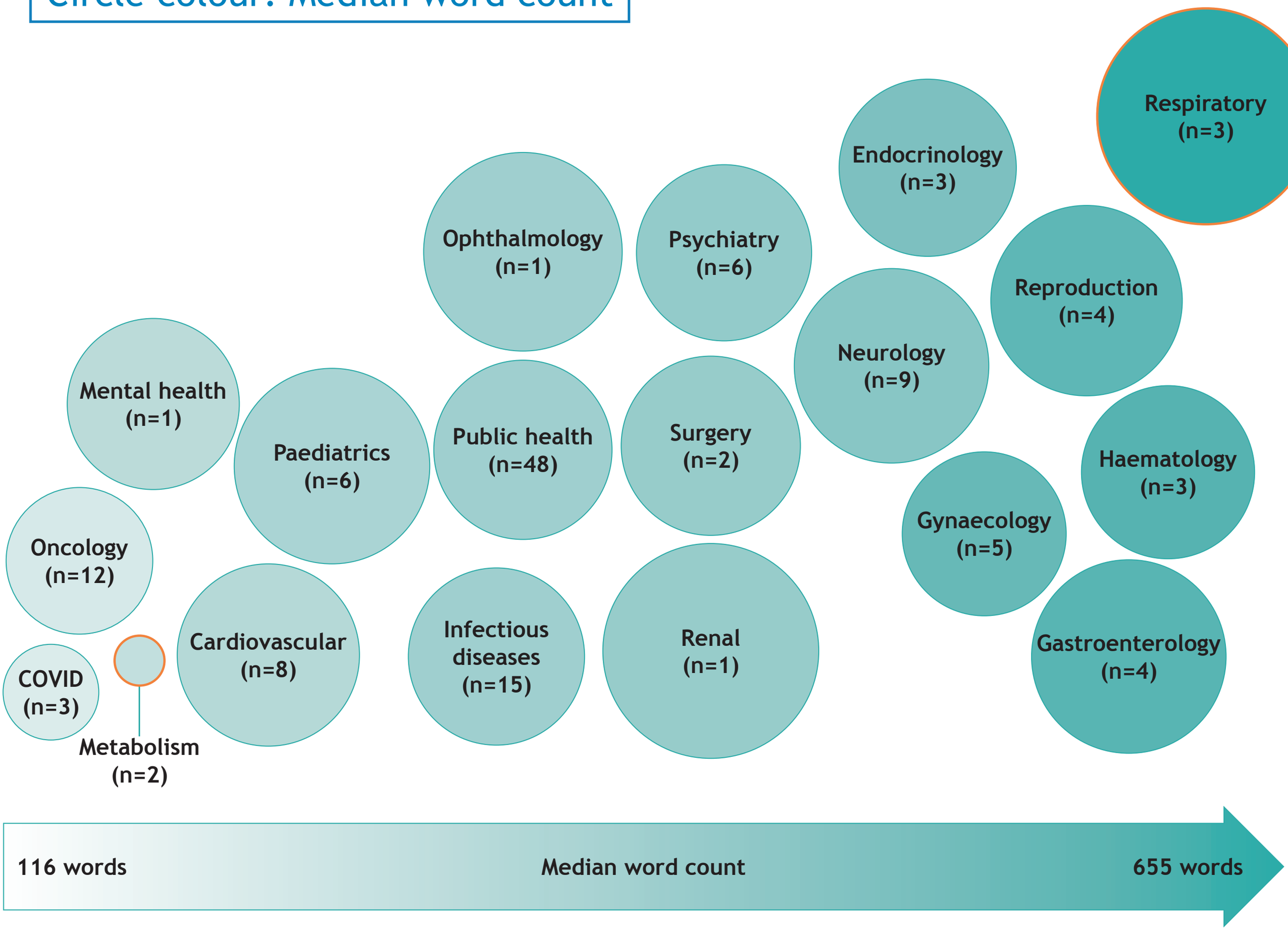
The readabilities* of PLS from the journals analysed were highly variable, but overall PLS that were easier to read tended be from journals with a broader target audience

***Readability is defined according to the Flesch Reading Ease score.**

Results

PLS readability* by therapy area

Circle size†: Median readability*
Circle colour: Median word count



The therapy area with the highest median readability* was respiratory and the therapy area with the lowest median readability* was metabolism

*Readability is defined according to the Flesch Reading Ease score. †Median readability was used to define the area of the circles.

Discussion points

Newspaper readability*

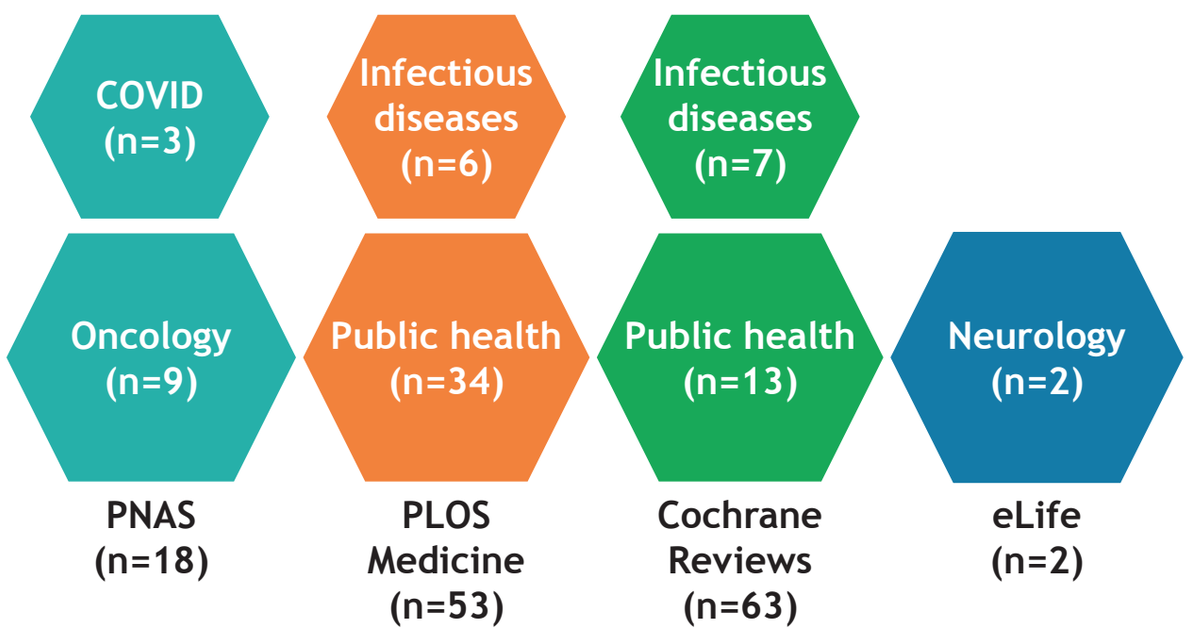
Based on the Flesch Reading Ease score, newspaper articles were still fairly difficult to read. This finding could be related to newspaper articles using a lot of proper nouns, such as people's names

Word usage

'Heterozygous'
OR
'Having two different copies of a gene'

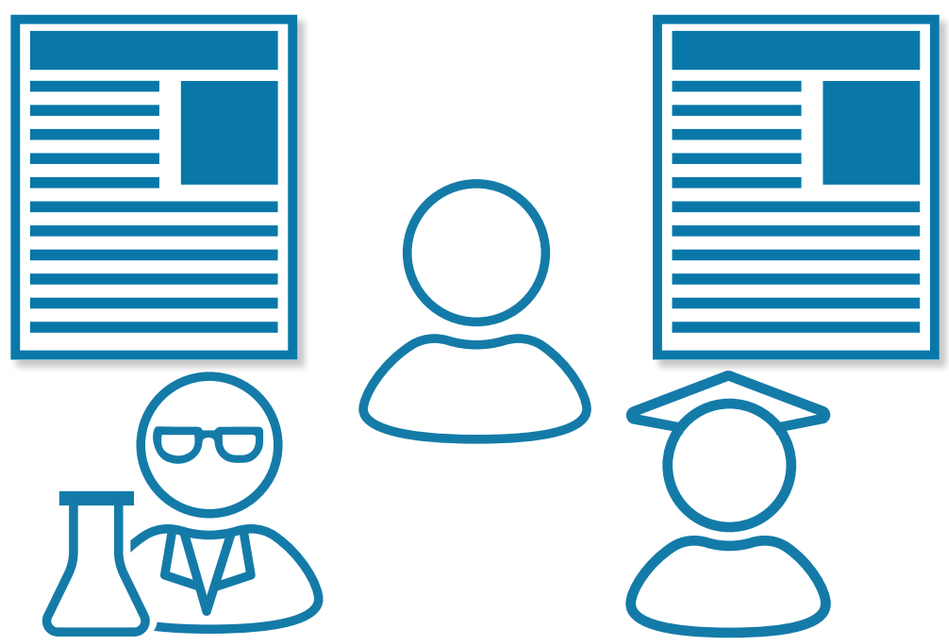
Readability* of PLS may have in part been associated with word count because explaining an idea simply tends to require more words than when using complex terminology

Top therapy areas by journal



The readability* of PLS by therapy area could have been biased by the fact that each journal has its own defined target audience and some journals published more articles within a specific therapy area in the issues examined

Target audience



Differences in the readability* of PLS are likely attributed to the target audience the journals aim to reach

Limitations

- Sample numbers were small for some journals
- Data from only one readability scale and from two time points are presented
- The Flesch Reading Ease score has various inherent limitations
- It is difficult to fully interpret all results as some non-scientific audiences may have developed an understanding of complex terminology

Looking forward

- It is important to ensure standardisation of PLS within the community and work together so that PLS can be more easily understood
- Collaborative efforts, including engagement with patients, should be encouraged

***Readability is defined according to the Flesch Reading Ease score.**