

First-generation PLS-Ps: moving from good to great

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Introduction

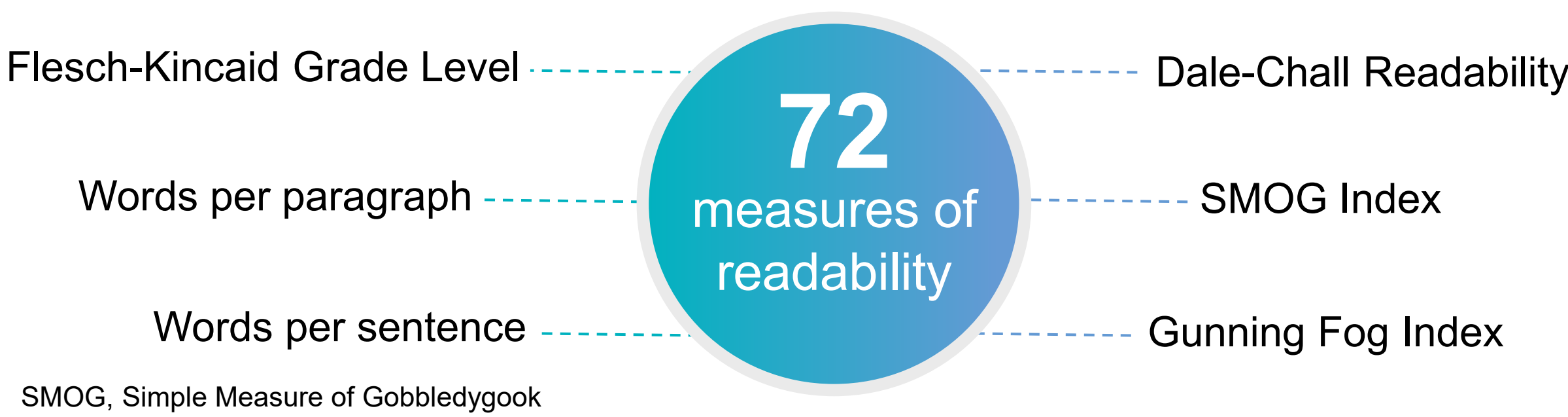
- Personal health literacy is defined by the United States Department of Health and Human Services, Healthy People 2030, as “the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.”¹ They also must decode instructions, symbols, charts, and diagrams, while weighing risks and benefits, ultimately making decisions and taking action
- Once an individual has received health information, how confident will they be to make well-informed decisions and properly advocate for their own health and wellness (self-efficacy); will they be able to *use* the health information, and not just understand it?^{1,2}
- First-generation plain language summaries of publications (PLS-P) have spawned numerous approaches and techniques to inform readability of published articles. Limited reports to date have documented specific recommendations regarding readability parameters on how to improve PLS-Ps
- Through combinations of third-party analytical analysis along with human review, we sought to determine key drivers of PLS-P readability, focusing on reader confidence (human variable)

Methods

PLS-P readability

- PLS-Ps were retrieved from publicly available sites using a predetermined search string and run through a third-party analytic tool (**Figure 1**)

Figure 1. Various types of analyses run through the readability tool



Human review

- Two consumers and a health literacy expert were invited to participate in this study (**Figure 2**) to assess the readability of PLS-Ps and to directly assess reader confidence of the published plain language summaries
- Using a 7-point Likert scale, with 1 being the least and 7 being the most, consumers were asked to rate retrieved PLS-Ps based on 5 variables deemed important for health literacy and self-efficacy as follows:

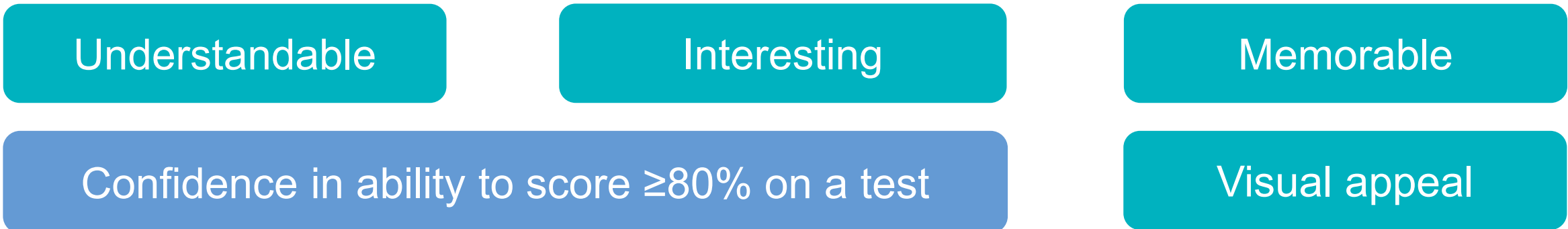
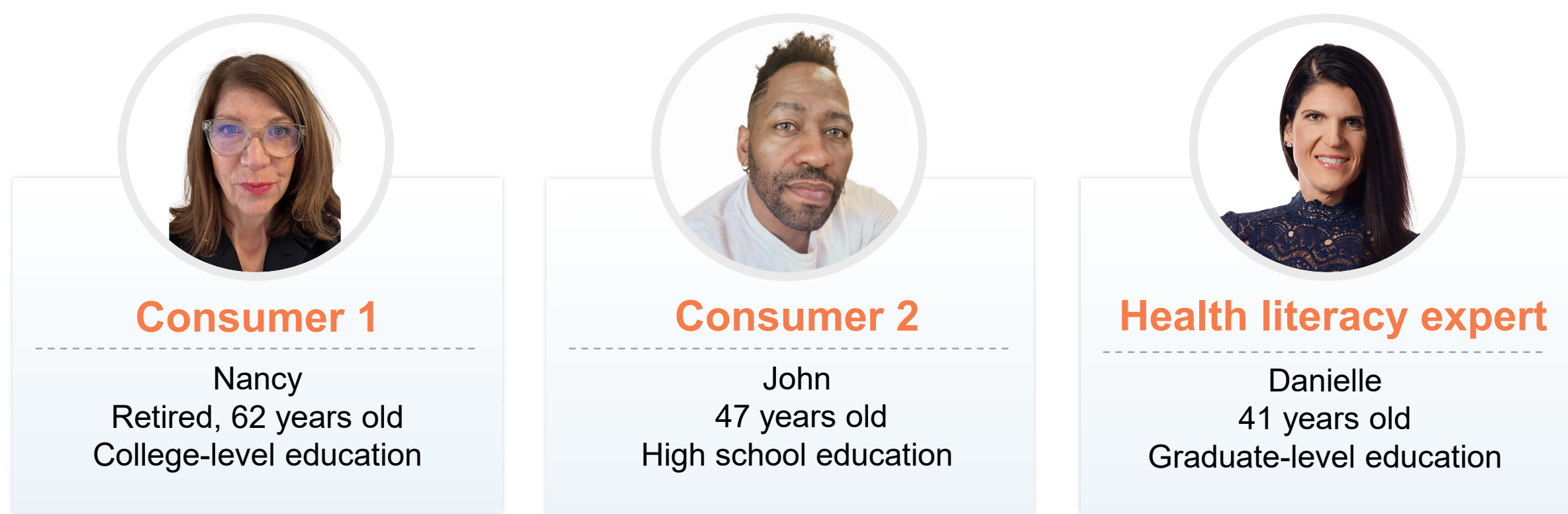


Figure 2. Our consumers and health literacy expert



Results

Literature search for PLS-Ps and their readability

- During the time span ranging from 2021 to 2023 and using the search term “plain language summary of a publication”, 116 PLS-Ps were retrieved from PubMed, Figshare, and Google, and run through a third-party analytic tool with 72 measures of readability (**Figure 3**)

Figure 3. Key items of interest revealed from the readability analysis

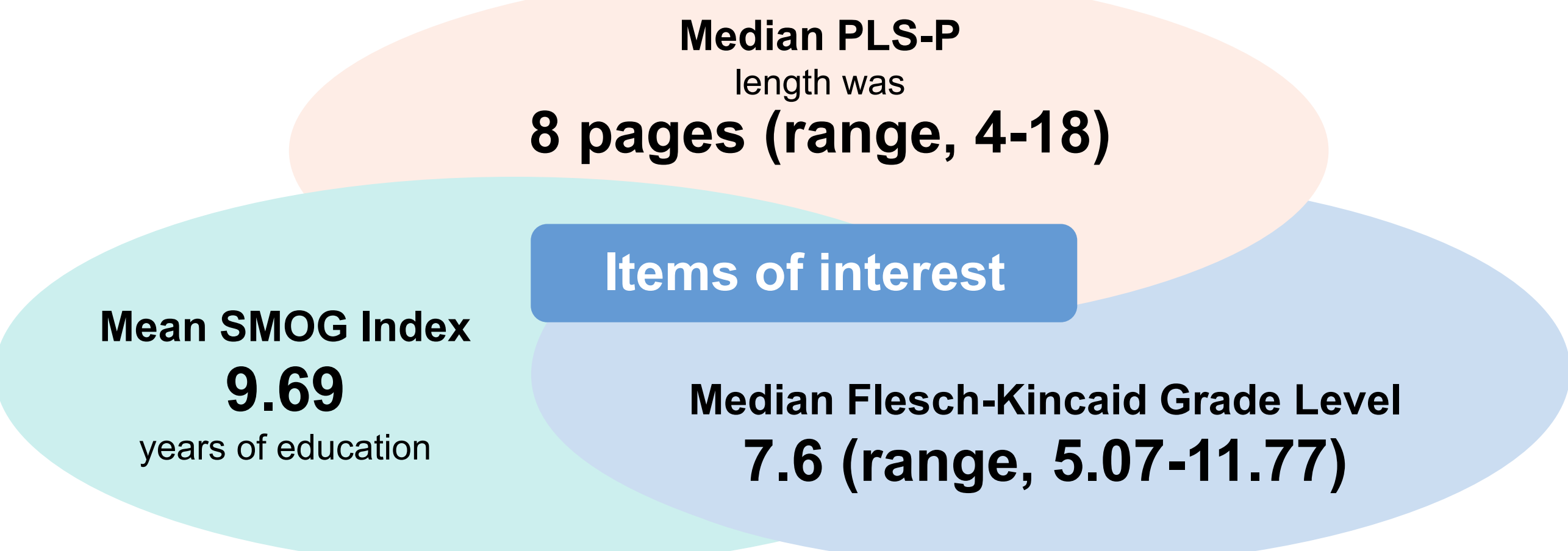
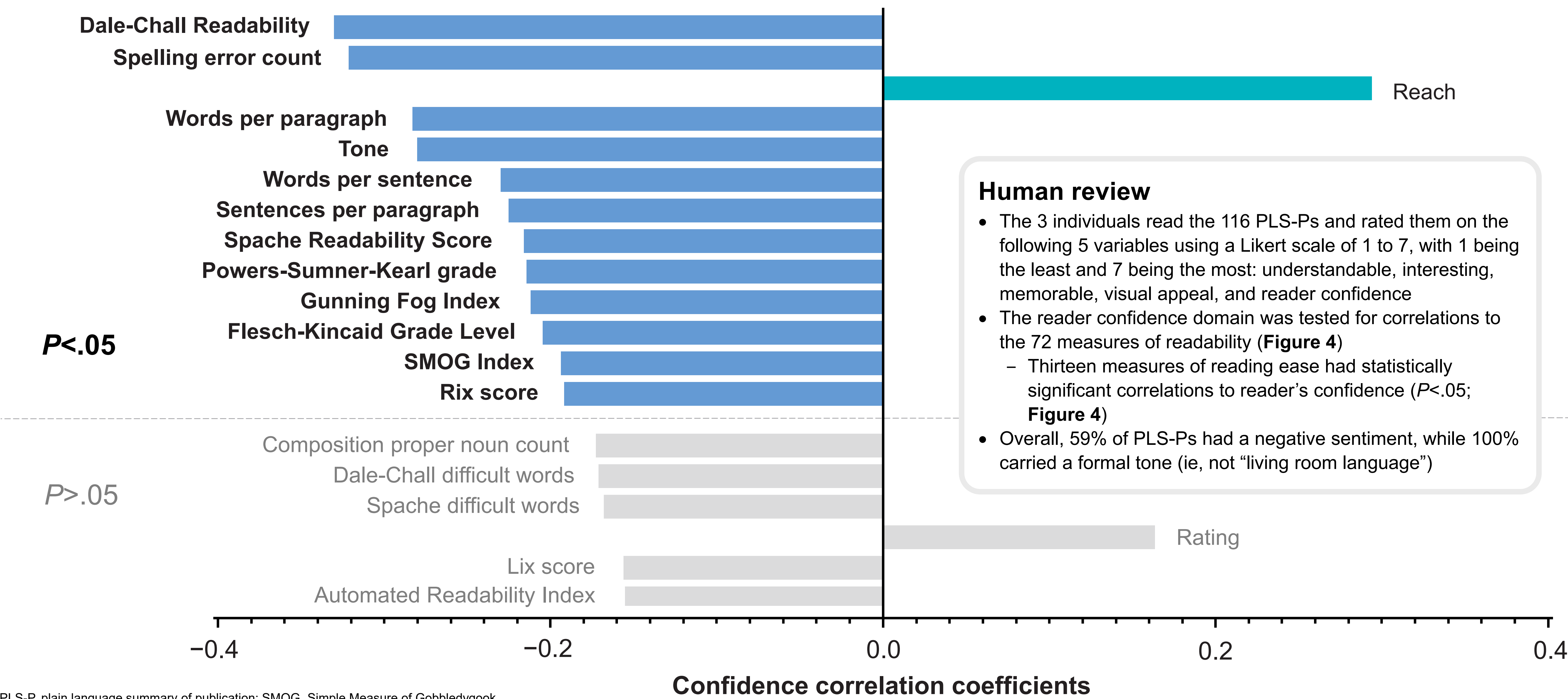


Figure 4. Readability test correlations on reader’s confidence^a



Human review

- The 3 individuals read the 116 PLS-Ps and rated them on the following 5 variables using a Likert scale of 1 to 7, with 1 being the least and 7 being the most: understandable, interesting, memorable, visual appeal, and reader confidence
- The reader confidence domain was tested for correlations to the 72 measures of readability (**Figure 4**)
 - Thirteen measures of reading ease had statistically significant correlations to reader's confidence (P < .05; **Figure 4**)
- Overall, 59% of PLS-Ps had a negative sentiment, while 100% carried a formal tone (ie, not “living room language”)

Insights

Readability tools together with human confidence ratings should be used to improve reader’s retention and improve self-efficacy in making medical decisions.

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Conclusions

- This analysis performed one of the broadest reviews of PLS-Ps to date
- Of the 116 PLS-Ps analyzed through the analytic tool and by our consumers, 13 measures of reading ease had statistically significant correlations to reader confidence
- Consumers reread and were tested on 15 PLS-Ps. They scored on average <80% on 13 PLS-Ps, while consumers scored ≥80% on only 2 PLS-P tests
- To improve reading ease and reader confidence with PLS-Ps:
 - ✓ Reduce words per sentence
 - ✓ Reduce PLS-P document length
 - ✓ Use a neutral-to-positive sentiment, and a neutral-to-informal tone
 - ✓ Reduce sentences per paragraph
 - ✓ Ensure Flesch-Kincaid and SMOG Index scores are within range
 - ✓ Test with members of the intended audience (ie, consumers)



Consumer and health literacy expert testing

- The 3 individuals were then tested on 15 randomly selected PLS-Ps
- Their reporting on the 5 domains for health literacy differed from their actual test scores in 15 randomly selected PLS-Ps (**Table 1**)

Table 1. Consumers self-reporting on 15 randomly selected PLS-Ps versus their actual test scores

PLS-P number used for human test	Likert scale ^a					Average actual test score, %
	Understandable	Interesting	Memorable	Visual appeal	Reader confidence	
4	5.67	5.33	4	4.33	4.67	53.3
11	6.67	4.67	4.67	5	5.67	26.7
15	6	5	5.33	5	5.67	63.3
21	6	5.33	5.33	4	5.33	43.3
22	6	6	5.67	5.67	5	60.0
61	6	6	5.67	6	5.33	80.0
76	6.67	6.33	6.33	6	6.67	86.7
77	6	5.67	5.67	5.67	6	66.7
81	7	6.67	5.67	6	5	60.0
89	6	5.33	4.67	5.67	5	46.7
94	5.67	5.67	5.67	5.33	5.67	70.0
98	6	5.33	5.33	5.33	5	33.3
102	6	6	5	4.33	4.33	56.7
107	6.67	5.67	5.67	5	6.33	63.3
112	5.67	5.33	4.67	4.67	5	70.0

References

- Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services. Healthy People 2030. Accessed March 20, 2024. <https://health.gov/healthyypeople>.
- American Psychological Association. Teaching tip sheet: self-efficacy. Accessed March 22, 2024. <https://www.apa.org/pi/aids/resources/education/self-efficacy#>.

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- All authors are employees of The Lockwood Group (Stamford, CT, USA)