How Much Science is in “Science-Based”? Adherence to Scientific Standards and Ethics among Fitness and Nutrition Influencers on YouTube

Daniel Otto, Tobias Giegerich, Georg Abel and Linn Ruangroj
European University for Innovation and Perspective, Germany

daniel.otto@ehip.eu
tobias.giegerich@ehip.eu
georg.abel@ehip.eu
linn.ruangroj@ehip.eu

Abstract: Social media platforms have become a primary source of health-related information, particularly in the fields of fitness and nutrition. Influencers increasingly use labels such as "science-based" or "evidence-based" to lend credibility to their content. However, the extent to which such claims are substantiated remains largely unexamined. This is particularly concerning given the limited digital health literacy among large segments of the population and the potential for misinformation to influence health-related behaviour. This study systematically analyses the scientific quality, transparency, comprehensibility, and ethical responsibility of fitness and nutrition content on YouTube. A theory-driven evaluation framework comprising 14 criteria across four dimensions was developed, drawing on established instruments including DISCERN, the JAMA criteria, HONcode, PEMAT, and GRADE. The sample comprised 48 videos from eight German-speaking YouTube channels with substantial reach, selected based on subscriber counts and video engagement. Content was assessed independently by four raters using a five-point Likert scale, with interrater reliability confirmed through Fleiss's kappa (κ = 0.66–0.73). Results indicate that while influencers generally achieve high scores for comprehensibility (M = 3.59) and moderate scores for transparency (M = 3.38), scientific accuracy (M = 2.12) and ethical responsibility (M = 2.28) remain considerably weaker, with relatively high differences among influencers. A hierarchical cluster analysis identified three distinct communication profiles: (1) popularisers and performers, who prioritise accessibility over scientific accuracy; (2) transparent communicators, who incorporate formal transparency elements but lack systematic evidence classification; and (3) scientifically based communicators, represented by a single channel, who combine methodological accuracy with accessible presentation. The findings reveal a structural tension between reach-oriented communication and adherence to scientific standards. Personal authority frequently substitutes for methodological substantiation, and commercial interests are often inadequately disclosed. The study concludes that ensuring quality in digital health communication requires closer integration of consumer protection, ethical guidelines, and scientific standards, including uniform disclosure requirements and verifiable quality labels.

Keywords: Youtube, Health Communication, Fitness And Nutrition Influencers, Parasocial Interaction, Halo Effect, Content Analysis, Quality Assessment Framework, Cluster Analysis, Evidence-based Communication, Consumer Protection

1. Introduction

In the digital age, communication about fitness and nutrition has increasingly shifted to social media. Platforms such as YouTube, Instagram, and TikTok are no longer merely for entertainment; they are also key sources of information on a range of topics, including diets, dietary supplements, and training strategies (Clark et al. 2023). Fitness and nutrition influencers play a crucial role, reaching millions of people with their content. Nevertheless, economic interests often drive their content, and they use labels such as 'evidence-based' or 'science-based' to bolster the credibility of their information. However, studies show that misinformation and disinformation are widespread in this area, for example, through generalised claims about the effectiveness of specific dietary supplements or through purported evidence on training methods and strategies that lack scientific support (Nickel et al. 2024). A recent Foodwatch report, for instance, reveals that deceptive health advertising for dietary supplements is rampant on social media and often difficult or impossible for users to identify. Complex issues such as study quality, levels of evidence, and statistical significance are frequently oversimplified or misinterpreted in influencer videos (Nickel et al. 2024). At the same time, however, it can be difficult for non-experts to determine whether content is scientifically valid or primarily intended to promote the influencer's own products or programmes (Zimba, Gasparyan & Qumar 2024).

Unsurprisingly, health and nutrition content is in high demand on social media, and scientific framing enhances perceived credibility. However, source references, methodological transparency, and critical reflection are often lacking (Richardson 2015; Silva et al. 2023). This is especially problematic given that more than half of the German population reports difficulty evaluating health-related information online, with digital health literacy being particularly low among those with lower education, chronic illness, or younger age (Schaeffer et al. 2023).

Current research indicates that the quality of medical and health-related content on YouTube is generally poor and often fails to meet scientific standards (Clark et al. 2023; Zimba, Gasparyan & Qumar 2024; Yoo & Kim 2012). In most cases, ethics and transparency are insufficiently addressed (Zimba et al., 2024). Influencers who make health-related statements are currently subject to limited regulatory oversight (Willis & Delbaere 2022). In addition to the lack of differentiated advice for vulnerable groups in influencers' recommendations, advertising content is often insufficiently labelled (Barari, Eisend & Jain 2025; De Veirman, Hudders & Nelson 2019). Furthermore, automated, API-based advertising on platforms such as YouTube, particularly in health-related contexts, has not been adequately regulated to date (Zimba et al., 2024). Overall, providing a careful scientific basis and methodological transparency seems to play a subordinate role to comprehensibility and reach among influencers. Even channels that explicitly advertise themselves as evidence-based or scientifically sound often provide only evidence in the form of vague references, without citing sources or assessing the quality of the studies (Richardson 2015; Powell & Pring 2024).

Influencer communication is credible and influences engagement and purchase intentions (Schiller 2025; Barari, Eisend & Jain 2025). Despite positive examples of reputable medfluencers promoting transparency and evidence-based statements (Schiller 2025), users often trust influencers even when content lacks scientific rigour or when commercial intent is unacknowledged (Shamim & Islam 2022). Social media should not replace personalised advice and requires critical, reflective use of information.

These results show that the comprehensibility of *science-based* content in the fitness and nutrition sector is not a sufficient criterion for qualitative evaluation. Instead, the scientific basis, compliance with scientific standards, acknowledgement of limitations, and ethical transparency of the content should be emphasised more closely to enable a valid and reliable evaluation.

2. Research Question

In response to the problem constellation outlined above, this article examines the scientific basis and transparency of fitness and nutrition videos on YouTube. YouTube was selected among social media platforms for its popularity as a source of information (Barari, Eisend & Jain 2025).

Specifically, it examines the following research question: To what extent do influencers who describe their videos as science-based adhere to scientific standards and transparency requirements?

To address this, the article employs a criteria-based analysis to evaluate the content produced by eight high-reach German-language YouTube channels specialising in fitness and nutrition. The channels were selected based on subscriber counts, and the scientific interpretation was conducted through a systematic qualitative analysis of 48 videos. The content was evaluated based on a theory-driven criterion grid with four dimensions: (1) transparency and credibility; (2) quality of scientific content; (3) comprehensibility and practical relevance; and (4) ethical responsibility. The study aims to assess the extent to which nutrition and fitness influencers operate in accordance with scientific standards and where they position themselves, or encounter limitations, in the trade-offs among reach, popularisation, and the requirements of good scientific practice.

Having outlined the problem, its relevance and the research question, the methodology will be explained in detail. Key findings will be presented and critically discussed, followed by implications for practical implementation.

3. Theoretical Foundation

Given the continued rise in social media use, the growing influence of influencers is hardly surprising. However, when viewed objectively, such influence seems rather irrational. Recommendations are most likely to be followed when they come from close peers, family or friends – thus people with whom one has some relationship. In the context of influencer communication, there is no *actual* relationship between influencers and their followers. Consequently, recommendations from *strangers* are given so much weight that they are often acted upon.

The effectiveness of influencer communication can be explained by the unconscious formation of *parasocial interactions*, which are rooted in parasocial relationship theory (Horton & Wohl 1956). Formulated initially in relation to traditional media, this theory characterises relationships as one-sided, pseudo-social bonds that audiences form with media figures. For traditional media, such as television and print, these relationships are characterised by a perceived intimacy that seems irrational, as no interaction between the public figure and the

observer occurs to foster any connection. When applied to influencer marketing, however, the effect is likely to be even amplified as interaction with influencers to some extent is possible, e.g. by commenting on posts and receiving back responses, strengthening the perceived bond, though it is still essentially an illusion of reciprocity. The meaning of parasocial engagement for purchase intention (Sokolova & Kefi 2020) or word-of-mouth (Balaban et al. 2022), e.g., has been widely confirmed by empirical research. It can be assumed that parasocial relationships can positively influence not only purchasing intentions but also actual behaviour.

In the context of health communication, another amplifying influence can be observed when these findings are considered: According to the *halo effect*, which originated in the field of social psychology and was first introduced by Nisbett and Wilson (1977), individuals tend to generalise from a single observable positive characteristic to an overall positive evaluation of a person or object. In this way, overestimation occurs unconsciously, as assessments are not grounded in sufficient evidence to justify the positive outcome. In health-related communication, this is referred to as the 'health halo effect', whereby isolated signals of health (e.g., physical appearance) positively influence the perceived credibility and quality of the content provided. The same logic applies to the disclosure of professions and academic titles to imply expertise and scientific credibility (Park et al. 2020).

In summary, these findings justify the need for a standardised framework to evaluate science-based influencer communication: parasocial relationships amplify influencer impact, while the halo effect promotes overestimation of expertise — a combination that particularly endangers groups with lower health literacy.

4. Methodology

4.1 Selection of Platform and Sample

As one of the most widely used video platforms worldwide and a central source of information, particularly in fitness and nutrition, YouTube was selected as the research object for this study (Barari, Eisend & Jain 2025). Unlike short video formats such as Instagram Reels or TikTok, YouTube allows for a comparatively more detailed presentation and greater depth of specialist content.

Suitable German-language YouTube channels were identified in a two-step process: First, a systematic keyword search using the following search combinations: “nutrition and/or fitness and/or training + scientific and/or evidence-based and/or science.” Second, through snowball sampling, additional potentially suitable channels were identified via links, recommendations, and related playlists. This method is used in social research to specifically recruit new research units through existing networks (Naderifar, Goli & Ghaljaie 2017).

The inclusion criterion for case selection was a minimum of 10,000 subscribers. This threshold falls within the lower end of the micro-influencer range (defined as those with 10,000–100,000 followers) in the existing literature. This ensures that influencers with professional production quality and stable reach are included, while also considering channels with larger audiences (macro- and mega-influencers) (De Veirman, Hudders & Nelson 2019; Kay, Mulcahy & Parkinson 2020). Channels with fewer than 10,000 subscribers, usually referred to as nano-influencers, were excluded as they often have lower visibility and less structured content. Of the more than 30 channels identified, the eight with the broadest reach were included in the case selection: Dr. Weigl (*Weigl*), *BroSep*, Nico Rittenau (*Rittenau*), Formel Froböse (*Froböse*), der Fitnessprofessor (*Fitnessprofessor*), Sjard Roscher (*Roscher*), Patric Heizmann (*Heizmann*), and Dr. Malte Puchert (*Puchert*). Six videos were selected per channel: the most-viewed individual posts between March 2024 and June 2025 with a total length of between 5 and 20 minutes. Interviews and panel discussions were excluded to ensure a consistent basis for evaluation. This resulted in a total sample of 48 videos.

4.2 Assessment Method

Various criteria regarding scientific standards and ethical requirements have been developed in the literature.

This study's classification system relies on the following recognised quality assessment scores for health information.:

- DISCERN (Charnock et al. 1999),
- JAMA-Criteria (Silberg, Lundberg & Musacchio 1997),
- HONcode (Boyer et al. 1998),
- PEMAT (Shoemaker, Wolf & Brach 2014),

- GRADE (Guyatt et al. 2008)

After careful selection and application to the research subject, four main dimensions were identified, yielding 14 criteria in total (four each for transparency and scientific accuracy, three each for comprehensibility and ethics). These are assessed on a 5-point Likert scale (1 = not at all; 5 = fully).

Table 1: Main categories and subcategories used to evaluate influencers' video content

Main Category	Subcategories
Transparency and credibility (*Transparency*)	Clear authorship
	References provided
	Disclosure of conflicts of interest
	Up-to-date information
Quality of scientific content (*scientific accuracy*)	Correct interpretation of scientific studies
	Comparison with scientific consensus
	Presentation of limitations and uncertainties
	Application of evidence-based medicine principles
Comprehensibility and practical relevance (*Comprehensibility*)	Language suitable for non-specialists
	Practical recommendations for action
	Structured and logical layout
Ethics and sense of responsibility (*Ethics*)	Use of disclaimer regarding medical advice
	Sensitive handling of vulnerable target groups
	Clear separation of advertising and editorial content

4.3 Coding and Reliability Testing

The 48 videos were coded independently by the four authors. Prior to the main coding phase, a calibration round was conducted using three randomly selected videos (one each from Dr. Weigl, BroSep, and Formel Froböse). Interrater reliability was assessed using Fleiss's kappa, yielding substantial agreement (Landis & Koch 1977): $\kappa = 0.66$ (Dr. Weigl), $\kappa = 0.68$ (BroSep), and $\kappa = 0.73$ (Formel Froböse). Based on these results, criterion descriptions were refined to reduce interpretive ambiguity before the remaining 45 videos were coded. This calibration procedure follows standard practice in qualitative content analysis, where trial coding serves to establish a shared understanding of the coding scheme rather than to assess reliability for each unit individually (cf. similar approaches in Clark et al. 2023). Kappa values for the full coding were not computed separately, which constitutes a limitation acknowledged below.

5. Results and Discussion

Presenting the results in the form of an average value for the four overarching dimensions provides an initial indication of influencers' strengths and weaknesses in general:

A. Transparency: 3.38
B. Scientific accuracy: 2.12
C. Comprehensibility: 3.59
D. Ethics: 2.28

Comparing the mean values for the four dimensions shows that influencers' strengths lie primarily in the transparency (A) and comprehensibility (C) of their content. Ethics (D) and, above all, scientific accuracy (B) lag significantly behind.

A more detailed presentation of the results (Figure 1) in the form of a star diagram illustrates the considerable differences in characteristics across the 14 subcategories of the four dimensions.

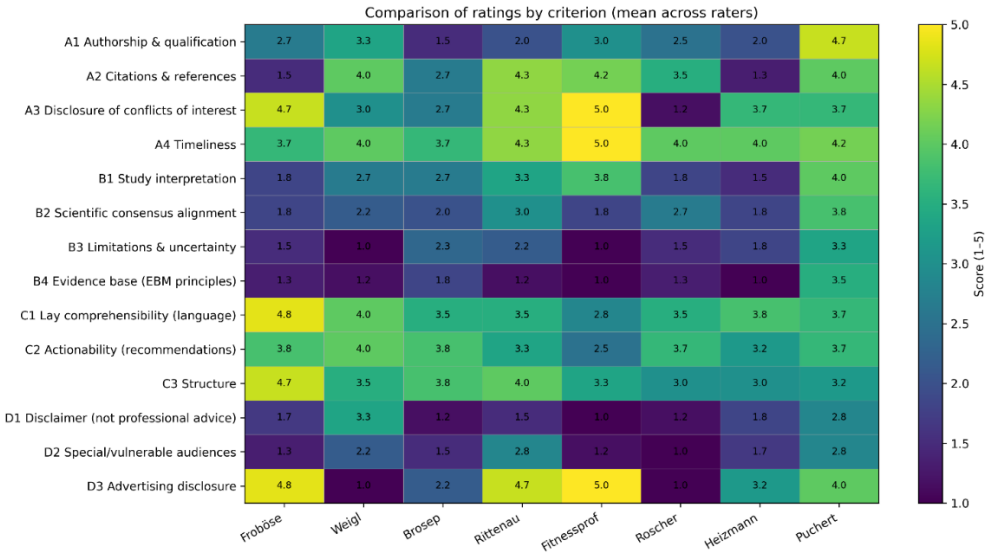
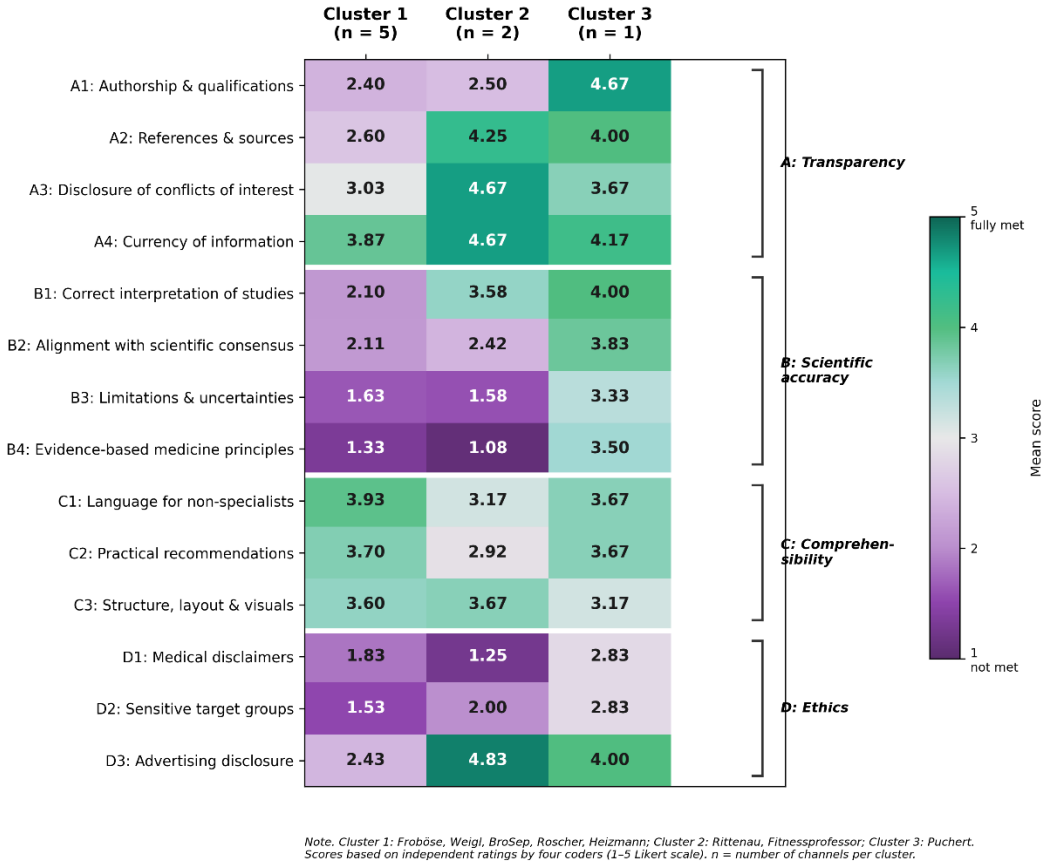


Figure 1: Comparison of results for each criterion and influencer

The characteristics indicate that, in addition to the fundamental trends, a distinction must be drawn among the various influencers. To achieve this differentiation, a hierarchical cluster analysis was performed based on all subcriteria (A1–D3), after standardisation, using the Ward method and Euclidean distance. This resulted in three stable clusters (Figure 2).

Figure 2: Cluster profiles with criterion-level mean scores



Note. Cluster 1: Froböse, Weigl, BroSep, Roscher, Heizmann; Cluster 2: Rittenau, Fitnessprofessor; Cluster 3: Puchert. Scores based on independent ratings by four coders (1–5 Likert scale). n = number of channels per cluster.

Figure 2: Cluster profiles with criterion-level mean scores (1–5 scale)

The criterion-level heatmap (Figure 2) reveals that differences between clusters are not uniform across subcriteria. B4 (evidence-based medicine principles) represents the weakest criterion overall, with even Cluster

3 reaching only M = 3.50. D3 (advertising disclosure) produces the largest inter-cluster variance, empirically substantiating the structural entanglement of content and commercialisation identified in the qualitative analysis.

The cluster analysis reveals three distinct profiles among the exclusively male fitness and nutrition influencers examined. While the clusters can be distinguished quantitatively, they exhibit some degree of heterogeneity when evaluated qualitatively. This is evident from the influencers' different professional backgrounds and qualifications.

- Cluster 1: Popularisers and Performers

This cluster is characterised by the highest comprehensibility of all the groups (M = 3.74). However, as the data show, this communicative accessibility is associated with the lowest levels of scientific depth (M = 1.79) and ethical reflection (M = 1.93). Two central characteristics can be identified in this group that reflect the tension between reach and scientific accuracy: First, there is a mixture of content and commercialisation. A structural feature of this cluster is the dual role of content creators, who serve as both information providers and entrepreneurs with their own product lines, particularly in the fields of dietary supplements and digital information products. This economic interdependence (as seen with the *BroSep* and *Roscher* channels, which operate their own supplement brands) can lead to conflicts of interest. If these conflicts are not made transparent and explicitly disclosed, they are difficult for recipients to recognise, and an almost irresolvable mixture of evidence-based education and sales-oriented marketing can result. Secondly, this cluster relies heavily on personal authority. The actors' former academic or medical professions – such as specialist status (Weigl) or a professorship in sports science (*Froböse*) – serve as key signals of credibility. This 'personal authority' appears to supersede the 'authority of the method' in the communication strategy: Statements are legitimised by expert status, eliminating the need to substantiate them with explicit references or evidence. This carries the risk that even promotional or scientifically untenable statements will be perceived as facts uncritically due to the academic halo effect (Nisbett & Wilson 1977).

In summary, this cluster prioritises lowering barriers to entry for people with lower levels of specialised knowledge over scientific transparency, with the line between this and product advertising sometimes becoming blurred.

- Cluster 2: Transparent Communicators

This cluster has the second-highest level of transparency of all groups (M = 4.02). The values for the scientific quality (M = 2.17), comprehensibility (M = 3.25), and ethics (M = 2.69) dimensions fall within the middle range. This positions this profile overall between the more popular channels of the first cluster and the more scientifically demanding channels of the third cluster. *Rittenau* is a nutrition communicator who specialises in plant-based nutrition, while *Fitnessprofessor* is a university professor of fitness science. Both individuals thus combine professional expertise with a strong social media presence. This cluster is characterised by a comparatively strong focus on transparency and disclosure. Qualifications and professional backgrounds are made visible, and in some cases, methodological references are provided, often alongside references to studies or quality promises. For example, for *Rittenau*, this includes references to scientific principles and product quality being part of his public image. *Fitnessprofessor* regularly refers to individual studies and current research in his videos. This practice enhances the cluster's perceived trustworthiness, thereby distinguishing it from more advertising-oriented formats. However, the limitations of this transparency strategy are also becoming apparent. For *Rittenau*, public debates on evidence-based nutritional advice often criticise the incorporation of anecdotal reports (e.g., from former vegetarians) in ways that make them appear more significant than they are. The *Fitnessprofessor* usually prioritises the straightforward presentation of individual study findings and practical recommendations over systematic classification in evidence hierarchies, comparison with review articles or explicit discussion of limitations. In both cases, scientific accuracy is addressed to some extent, but is not embedded in a broader, critically reflected, evidence-based approach.

Cluster 2 thus represents an intermediate form: it incorporates elements of formal transparency that distinguish it from the reach-oriented Cluster 1, but falls short of systematically evidence-based communication, as studies are cited selectively, anecdotal evidence is sometimes given undue weight, and conflicts of interest are not consistently addressed.

- Cluster 3: scientifically based communicators

This cluster has the highest scores for transparency (M = 4.13), scientific accuracy (M = 3.67), and ethical reflection (M = 3.22), and is also easy to understand (M = 3.50). Unlike the other clusters, this profile is represented exclusively by a channel run by *Puchert*. This makes it a rare but analytically distinguishable form of health and fitness communication. *Puchert* is a cell biologist, fitness trainer and biology and chemistry teacher. His videos are characterised by the systematic unfolding of complex biomedical relationships, backed up by precise references and discussed in a methodologically transparent manner. Rather than focusing on personal appeal or entertaining presentation, this profile emphasises the 'authority of the method'. Studies are cited, their significance is explained, and findings are clearly categorised according to the current state of research. Commercial interests appear only rarely; they are not the focus of communicative practice. From a normative perspective, this cluster most closely aligns with the concept of a *science-based* influencer profile. A comprehensible, non-specialist-friendly presentation is explicitly intertwined with criteria of scientific accuracy, transparency, and ethical responsibility. However, the fact that it is a one-person operation makes it clear that this communication pattern is the exception rather than the rule among high-reach fitness and nutrition influencers and thus sets a benchmark rather than reflecting current practice.

5.1 Limitations

Despite its carefully derived and applied methodology, this study has several limitations. Firstly, the sample comprises only eight male, German-speaking YouTube channels, so it is difficult to generalise the findings to a broader range of fitness and nutrition influencers in terms of gender, language, style and positioning. Although a reliability check was performed before coding, a certain degree of interpretative leeway remains in the qualitative assessments, which may be reflected in borderline cases of category assignment and in the weighting of individual criteria. Moreover, interrater reliability was assessed only during the calibration phase and not recomputed for the full sample, which limits the verifiability of coding consistency across all 48 videos. Additionally, the analysis covers a limited period and focuses on the 'most clicked' videos; thus, less popular content and longer-term developments are only represented to a limited extent. Although the evaluation criteria were assessed for plausibility and adjusted accordingly, they were not formally validated. This means it is unclear to what extent the measurement captures the intended quality construct. Finally, as the study does not capture reception or impact among the potential target group, no conclusions can be drawn about actual influence or behavioural changes (Powell & Pring 2024). Consequently, the findings should be assessed in the context in which they were obtained.

6. Conclusion and Implications

Analysing fitness and nutrition influencers on YouTube who present themselves as science-based reveals a consistent tension: high comprehensibility and communication accessible to non-specialists often go hand in hand with limited scientific depth, insufficient contextualisation of evidence, and deficits in transparency and ethics. However, some channels demonstrate that comprehensibility and methodological accuracy can be combined, but these remain the exception in this field. Overall, personal branding appears to be prioritised over methodological accuracy in content sharing. Pielke (2007) distinguishes four ideal types of science communication: the Pure Scientist, the Science Arbiter, the Issue Advocate, and the Honest Broker of policy alternatives. The latter role — structuring available options, disclosing uncertainties, and connecting practical conclusions to degrees of evidence — provides a normative reference point for evaluating influencer communication. However, the cluster analysis demonstrates that this ideal is structurally constrained under platform conditions: algorithmic attention economies incentivise simplification (Cluster 1), monetisation through proprietary product lines generates undisclosed conflicts of interest (Clusters 1 and 2), and parasocial dynamics favour personal over methodological authority. These constraints are not primarily individual failings but systemic features of digital platform communication. We therefore propose the concept of 'Bounded Honest Brokerage' as a realistic functional ideal: science-oriented communication that (a) makes transparent what is known, uncertain, and unknown; (b) explicitly discloses commercial interests and their potential influence on content; and (c) distinguishes personal expertise from the authority of the scientific method — while acknowledging that complete impartiality is structurally unattainable in algorithm-driven media environments.

To account for findings from parasocial relationship theory and the halo effect, and to ensure that quality is maintained more reliably, consumer protection, ethical guidelines, and scientific standards should be more closely interlinked. This could be achieved through the following actions: Firstly, by establishing uniform

disclosure requirements regarding sources, levels of evidence and conflicts of interest. Secondly, by using verifiable quality labels that meet minimum criteria, such as separating information from advertising, fostering a culture of continuous correction, and linking to primary sources. Moreover, thirdly, through the co-creation of formats in which expert communities and creators provide standardised evidence profiles. On the platform side, more consistent labelling of promotional content and prompts for communicating uncertainty would be an obvious step. From the audience's perspective, a critical reception approach is needed that evaluates evidence claims against independent sources and distinguishes advertising from editorial content.

In summary, science-based health communication on platforms is possible when comprehensibility, uncertainty communication, and transparency are balanced systematically. However, under the current incentive structures, the ideal of the honest broker remains the exception. This shows the need for quality assurance frameworks and clear communication standards.

Competing Interests

The authors have no competing interests to declare.

Ethics Declaration

This study analysed publicly available YouTube video content. No human participants were recruited, interviewed, or surveyed. The influencers examined are public figures who publish content intended for mass distribution. As the research involved only the analysis of publicly available online material, without direct interaction with individuals or the collection of personal data, ethical approval was not required under the authors' institution's guidelines.

AI Declaration

The authors used AI-assisted tools for proofreading (spelling and grammar) and for translation support. All substantive intellectual work, including study design, data analysis, interpretation, and manuscript content, was performed by the authors. The authors take full responsibility for the final text.

References

Balaban, D.C., Szambolics, J. and Chirică, M. (2022) ‘Parasocial relations and social media influencers’ persuasive power: Exploring the moderating role of product involvement’, *Acta Psychologica*, Vol. 230, Article 103731.

Barari, M.M., Eisend, M. and Jain, S.P. (2025) "A meta-analysis of the effectiveness of social media influencers: Mechanisms and moderation", *Journal of the Academy of Marketing Science*, advance online publication.

Boyer, C., Selby, M., Scherrer, J.-R. and Appel, R.D. (1998) "The health on the net code of conduct for medical and health websites", *Computers in Biology and Medicine*, Vol. 28, No. 5, pp. 603–610.

Charnock, D., Shepperd, S., Needham, G. and Gann, R. (1999) "DISCERN: An instrument for judging the quality of written consumer health information on treatment choices", *Journal of Epidemiology and Community Health*, Vol. 53, No. 2, pp. 105–111.

Clark, L., Lopez, E.-I.D. et al. (2023) "Nutrition-related information shared by Latine influencers: A YouTube content analysis", *Health Promotion Practice*, Vol. 24, No. 4, pp. 713–722.

De Veirman, M., Hudders, L. and Nelson, M.R. (2019) "What is influencer marketing and how does it target children? A review and direction for future research", *Frontiers in Psychology*, Vol. 10, Article 498106.

Guyatt, G.H., Oxman, A.D., Vist, G.E. et al. (2008) "GRADE: An emerging consensus on rating quality of evidence and strength of recommendations", *BMJ*, Vol. 336, No. 7650, pp. 924–926.

Horton, D. and Wohl, R. (1956) ‘Mass communication and para-social interaction: Observations on intimacy at a distance’, Psychiatry, Vol. 19, No. 3, pp. 215–229.

Kay, S., Mulcahy, R. and Parkinson, J. (2020) "When less is more: The impact of macro and micro social media influencers' disclosure", Journal of Marketing Management, Vol. 36, No. 3–4, pp. 248–278.

Landis, J.R. and Koch, G.G. (1977) "The measurement of observer agreement for categorical data", Biometrics, Vol. 33, No. 1, pp. 159–174.

Naderifar, M., Goli, H. and Ghaljaie, F. (2017) "Snowball sampling: A purposeful method of sampling in qualitative research", *Strides in Development of Medical Education*, Vol. 14, No. 3, pp. 1–6.

Nickel, B., Heiss, R., Shih, P. et al. (2024) "Social media promotion of health tests with potential for overdiagnosis or overuse: Protocol for a content analysis", *JMIR Research Protocols*, Vol. 13, No. 1, e56899.

Nisbett, R.E. and Wilson, T.D. (1977) "The halo effect: Evidence for unconscious alteration of judgments", *Journal of Personality and Social Psychology*, Vol. 35, No. 4, pp. 250–256.

Park, K., Kwak, H., Song, H. and Cha, M. (2020) "Trust me, I have a Ph.D.: A propensity score analysis on the halo effect of disclosing one's offline social status in online communities", *Proceedings of the Fourteenth International AAAI Conference on Web and Social Media (ICWSM 2020)*, pp. 500–511.

Pielke, R.A. Jr. (2007) *The Honest Broker: Making Sense of Science in Policy and Politics*, Cambridge University Press, Cambridge.

Powell, J. and Pring, T. (2024) "The impact of social media influencers on health outcomes: Systematic review", *Social Science & Medicine*, Vol. 340, Article 116472.

Richardson, D.P. (2015) "Consumer communication of nutrition science and impact on public health", in Town, W.G. and Currano, J.N. (eds.) *Science and the Law: How the Communication of Science Affects Policy Development in the Environment, Food, Health, and Transport Sectors*, American Chemical Society, Washington, DC, pp. 29–46.

Schaeffer, D., Gille, S., Berens, E.-M. et al. (2023) "Digitale Gesundheitskompetenz der Bevölkerung in Deutschland: Ergebnisse des HLS-GER 2", *Das Gesundheitswesen*, Vol. 85, No. 4, pp. 323–331.

Schiller, T. (2025) "Risiken und Nebenwirkungen ärztlicher Kommunikation über Social Media", *Die Dermatologie*, Vol. 76, No. 11, pp. 757–760.

Shamim, K. and Islam, T. (2022) "Digital influencer marketing: How message credibility and media credibility affect trust and impulsive buying", *Journal of Global Scholars of Marketing Science*, Vol. 32, No. 4, pp. 601–626.

Silberg, W.M., Lundberg, G.D. and Musacchio, R.A. (1997) "Assessing, controlling, and assuring the quality of medical information on the Internet: Caveant lector et viewor – Let the reader and viewer beware", *JAMA*, Vol. 277, No. 15, pp. 1244–1245.

Shoemaker, S.J., Wolf, M.S. and Brach, C. (2014) "Development of the Patient Education Materials Assessment Tool (PEMAT): A new measure of understandability and actionability for print and audiovisual patient information", *Patient Education and Counseling*, Vol. 96, No. 3, pp. 395–403.

Silva, P., Araújo, R., Lopes, F. and Ray, S. (2023) "Nutrition and food literacy: Framing the challenges to health communication", *Nutrients*, Vol. 15, No. 22, Article 4708.

Sokolova, K. and Kefi, H. (2020) 'Instagram and YouTube bloggers promote it, why should I buy? How credibility and parasocial interaction influence purchase intentions', *Journal of Retailing and Consumer Services*, Vol. 53, Article 101742.

Willis, E. and Delbaere, M. (2022) "Patient influencers: The next frontier in direct-to-consumer pharmaceutical marketing", *Journal of Medical Internet Research*, Vol. 24, No. 3, e29422.

Yoo, J.H. and Kim, J. (2012) "Obesity in the new media: A content analysis of obesity videos on YouTube", *Health Communication*, Vol. 27, No. 1, pp. 86–97.

Zimba, O., Gasparyan, A.Y. and Qumar, A.B. (2024) "Ethics for disseminating health-related information on YouTube", *Journal of Korean Medical Science*, Vol. 39, No. 7, e93.