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# Repeated Appeal to Tradition and Use of Pseudoscientific Jargon Decrease Instead of Increase Preference for Fictitious Herbal Products

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Non-evidence-based traditional, complementary, and alternative medicine (TCAM) practices can lead to harmful health outcomes, so media reporting about it should be responsible. Drawing from a media content analysis, we created three vignettes about a fictional herbal product: one repeatedly appealed to tradition, one used extensive pseudoscientific jargon, and one followed WHO reporting guidelines (i.e., active control). In an online community sample ($N$ = 366), we tested their effects on product preference, and if these were more pronounced in individuals receptive to pseudo-profound verbalisms, magical health beliefs, and positive attitudes toward TCAM. Unexpectedly, reading the vignettes decreased product preference; the decrease was smaller in those prone to magical health beliefs and receptive to pseudo-profound verbalisms. The effect might stem from the overuse of arguments, making the interventions resemble the so-called 'paradoxical thinking interventions'. Future research should find a "tipping point" that reverses the effect by varying the number of supportive claims.

*Key words:* traditional, complementary and alternative medicine (TCAM), appeal to tradition, pseudoscientific jargon, pseudo-profound verbalisms, magical health beliefs

## Introduction

To remain healthy or get better if ill, people turn not only to advice from well-verified sources but also to the use of non evidence based practices (Harris et al., 2012; Knežević et al., 2024; Lee et al., 2022; Souček & Hofreiter, 2022). The danger associated with using these products lies in the potentially diffuse

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effects, interactions between conventional and unconventional medicine, and increased mortality rates as a result of the cessation of the use of conventional medical practices (review in Lazić et al., 2023). Traditional medicine comprises a body of knowledge, skills, and practices based on the theories, beliefs, and experiences of a specific culture such as using garlic for prevention and treatment, or making poultices and ointments from local plants. Complementary and alternative medicine is a broad set of practices that are neither part of a culture's medical tradition nor originate from the official healthcare system (World Health Organization [WHO], 2019), such as pulse diagnosis, homeopathy, Reiki technique. Unconventional medical practices are used either as replacement or, more commonly, alongside conventional medical treatments (Purić et al., 2022). While their effectiveness is non-existent or debatable, the popularity of traditional, complementary and alternative medicine (TCAM) continues to rise, particularly when the healthcare system faces challenges (Teovanović et al., 2021). Meta-analytic findings show that 24-71.3% of surveyed individuals worldwide reported using TCAM products or practices in the last 12 months (Lee et al., 2022); lifetime prevalence of TCAM use on a representative sample of Serbian adults was found to be 99% (Knežević et al., 2024). Given the often insufficient empirical evidence for the effectiveness of such practices, and, simultaneously, their widespread use, the World Health Organization (WHO) recommends that media reporting and advertising should be carried out more diligently. That means the media should address both the positive and negative consequences of TCAM use and advise consumers to consult their physician, among others, before use (WHO, 2004). There is evidence, however, that the media do not follow these guidelines. For example, a content analysis of Serbian media shows that the majority of articles about TCAM products describe them in a strictly positive and uncritical way, do not cite sources for their claims and fail to mention any potential risks or to recommend consulting a healthcare provider before use (Lazić et al., 2023). The same study showed that reports are heavily saturated with various types of appeals, such as the appeal to tradition ("ancient Russian remedy" – 65.3%), naturalness ("magical gift of nature" – 45.5%), and ease of use ("easy to apply and more affordable" – 40.9%), as well as abuses of scientific authority, primarily by using pseudoscientific jargon ("as an exceptional antioxidant, aronia berries prevent free radical formation" – 59.7%) (Lazić et al., 2023). However, there is a notable lack of data on appeals effectiveness in influencing reader behaviors, i.e., their willingness to use, recommend, and positively evaluate the fictitious herbal product. The potential to experimentally manipulate these tendencies has been examined and confirmed by varying the descriptions of CAM industry – as benevolent and non-profitable or malevolent and highly profitable, so called "Big Suppla" (Mijatović et al., 2022). For the current study, a decision to contrast the effectiveness of appeal to tradition and pseudoscientific jargon was made for two reasons: a) these are the two most frequent types of appeals (Lazić et al., 2023), and b) appeal to tradition is mostly used when there is an absence of scientific evidence (Peacock et al., 2019). Appeal to tradition relies on the bias towards tradition (longevity bias – "what is old/ancient is good" (Eidelman et al., 2010) or even existence bias – "something is good simply because it exists"; Eidelman et al., 2009), whilst the pseudoscientific jargon relies on participants using science as a heuristic of sorts ("what seems scientific is good"; Lukić & Žeželj, 2024).

These appeals will not, however, be equally effective on everyone. It is expected that in-

dividuals who are more prone to superficial informational processing as well as irrational beliefs, will be more receptive to the appeals.

Receptivity to pseudo-profound verbalisms represents the tendency to regard as profound those statements that use abstract words, with syntactically correct structures but lacking real meaning, and are made to impress and/or persuade, regardless of the truth of what is being said (Ilić & Damnjanović, 2021; Pennycook et al., 2015). Findings indicate that receptivity to pseudo-profound verbalism is associated with a preference for an intuitive cognitive style (Evans et al., 2020; Pennycook et al., 2015), suggesting that receptive individuals make decisions in a less analytical and less critical manner (Littrell et al., 2021). This explanatory mechanism may underlie the participants' willingness to recommend and use a fictitious herbal product, as well as positively evaluate it when the product is described with an appeal to tradition, due to uncritical processing of the presented information. Similar processes could be expected in the group exposed to pseudoscientific jargon. Additionally, pseudoscientific appeals are sometimes treated as a special type of pseudo-profound verbalisms ($r$ = .60 between bullshit and scientific bullshit; Evans et al., 2020).

Magical health beliefs refer to beliefs that are neither empirically, logically, nor scientifically based but are consistent with people's intuitive ideas about how the body functions and adhere to the so-called "laws" of magical thinking (Lindeman et al., 2000). Previous research showed a moderate positive correlation between magical health beliefs and the use of alternative medicine ($r$ = .41; Aarnio & Lindeman, 2004). Therefore, the effectiveness of appeals regarding willingness to use and recommend the products could be greater if one is fostering these beliefs.

Attitudes towards TCAM encompass beliefs about its efficacy, emotional responses it elicits, and intentions or tendencies to use it (Purić et al., 2022). As more positive attitudes towards TCAM can be associated with more negative views of conventional medical practices (Bryden et al., 2018), it is expected that participants with more favorable attitudes toward TCAM will be more willing to seek alternatives in unconventional medical practices. Thus, the effectiveness of appeals regarding evaluation and willingness to use and recommend the unconventional medicine products could be greater if someone has more positive attitudes towards TCAM.

## The Present Study

In this study, we have tested the effects of specific descriptions of products from unconventional medicine on participants' willingness to use, recommend, and positively evaluate them. Specifically, we compared the effectiveness of different types of appeals in advertising fictitious herbal products that fall within the TCAM domain.

**H1:** The participants' willingness to use, recommend, and positively evaluate the herbal product will increase more after reading vignettes in which the product is described using appeals to tradition and pseudoscientific jargon than in the control group vignette, which we wrote in accordance with the recommendations of the World Health Organization.

**H2:** The effect of exposure to product advertising using appeals to tradition and pseudoscientific jargon on the willingness to use, recommend, and positively evaluate herbal products will be more pronounced:

**H2a:** in participants more receptive to pseudo-profound verbalisms;

**H2b:** in participants more prone to magical health beliefs;

**H2c:** in participants with more positive attitudes towards TCAM.

Given that both types of appeals used in the experimental groups are proven to be highly frequent in Serbian media (Lazić et al., 2023), we had an additional, exploratory goal in our research. In this segment we wanted to determine whether one type of appeal had a greater effect on participants' willingness to use, recommend or positively evaluate the described products.

Our hypotheses were preregistered (https://aspredicted.org/jgc5-9m9m.pdf). The IRB at the Department of psychology, University of Belgrade, approved the research design (No 2023-75).

## Method

### Sample

The sample consisted of Serbian speaking participants and was convenient, primarily recruited by sharing the link on social networks. To reach a diverse group of participants, we also engaged with online groups that foster positive attitudes toward unconventional medical practices (e.g., *Alternative medicine*) as well as unrelated groups (humanitarian aid groups). Participants recruitment had two phases. A portion of the sample consisted of students who received course credit as compensation.

Data collection occurred in two phases. In the first collection phase, we recruited 365 participants; after excluding those who failed the attention checks, the sample included 200 participants; missing data were replaced with mean scores for the measured trait. To obtain an adequately powered sample, we recruited additional 202 participants, out of which 166 remained, excluding those who failed at least one attention check.

The final sample consisted of 366 participants – 200 from the first and 166 from the second collection phase. The majority of the participants (83%) were female. The average participant was around 29 years old ($SD$ = 9.76) and had completed 14 years of formal education on average ($M$ = 13.97, $SD$ = 2.42), corresponding to a high school degree with some pursuing further studies. The majority reported having no chronic diseases (85%) and rated their health as very good or good. The sample size was adequate to detect the intended effects (Faul et al., 2007). Additional details regarding the sample characteristics and the G*Power analysis conducted to inform sample generation can be found in Online supplements G and H.

### Design

The study followed a 3 (experimental manipulation: appeal to tradition vs. pseudoscientific jargon vs. control; between-subjects) x 2 (time: pretest vs. posttest; within-subjects) mixed design. We measured participants' willingness to use, recommend, and positively evaluate these products before and after experimental manipulation. Pseudo-profound verbalisms, magical health beliefs, and positive attitudes towards TCAM served as moderators.

Research was conducted using the SoSci Survey platform (Leiner et al., 2018). The overall flow of the experiment is summarized in Figure 1. In the pretest, participants filled out the informed consent (Online supplement A) and socio-demographic information and answered questions regarding their attitude towards two categories of herbal products used in the treatment or prevention of diseases of the digestive tract (digestive organs) and inflammatory skin processes (acne and pimples). In this set we also used buffers to neutralize the impression that the questions about herbal products leave, but also to mask the real subject of the research. Lastly, we measured moderator variables, along with three attention checks.

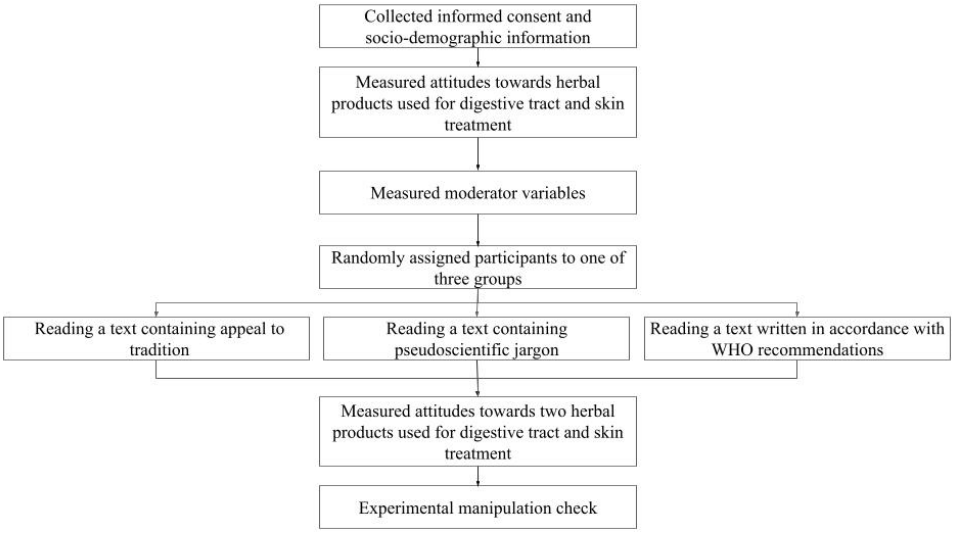



*Figure 1* Experimental design flowchart.

In the posttest, participants were randomly assigned to one of the three experimental conditions. In the first experimental group fictitious herbal products were described using the appeal to tradition. In the second experimental group same products were described using pseudoscientific jargon. The control group products were described without using any one-sided persuasive strategies, i.e., using WHO guidelines. After that, all participants answered a set of questions concerning their attitude towards the two categories of herbal products of the same purpose as those described in the vignette. Lastly, they went through a new set of buffers and evaluated the author and the written texts (experimental manipulation check), and read the debriefing (Online supplement F).

**Experimental Procedure**

To look as authentic as possible, all vignettes were created using Canva. Along with the text and the title, we added an image of a fictitious plant. All vignettes have an approximately equal number of words (290 ± 20).

In constructing the texts, we drew from the findings of Lazić et al. (2023) on media reporting on TCAM: the appeals were typical in content and length. Examples of Serbian media TCAM reports were also used to inform the writing style and formatting of the text (e.g., the excess use of capital letters to highlight specific words). Full texts of all vignettes are available in Online supplement C.

In the first experimental group, fictitious herbal products were described using the appeal to tradition. Referring to traditionality means referring to the centuries-old use by our “ancient ancestors”. Following the example of media reporting, this vignette did not contain any reference to empirical evidence of its effectiveness. The participants had to see for themselves that products with such a long tradition “must” also be effective because their long existence confirms their qualities (Peacock et al., 2019).

In the second experimental group, same products were described using pseudoscientific jargon, which means using abstract scientific terms in a vague or nonsensical manner, or non-scientific terms chosen to resemble scientific ones (Littrell et al., 2021). Thus, the participants read a text saturated with phrases such as *biocosmic energy* or *psychotronic amplification system* (Coker, 2001).

In the active control group, fictitious herbal products were described in line with WHO recommendations (WHO, 2004). We clearly highlighted the goal of the text (informing about the products), described all the (alleged) advantages of use without leaving out the potential risks of usage. We listed (fictional) relevant sources of information and referred to experts' assessment of their quality. We listed consequences of parallel usage of several TCAM practices and practices originating from conventional medicine, and information on the recommended dose, time of consumption, and duration of treatment. Participants were recommended to consult their doctor or pharmacist before using the products (WHO, 2004). We deliberately avoided exposing the control group to entirely irrelevant content (zero-level control) in order to apply a stricter test of appeal effectiveness. Instead, our control condition followed the so-called *standard of care* model used in medical research, where participants receive the best currently available practice rather than a placebo (Bhutta, 2004).

**Instruments and Variables**

***Dependent Variables***

As in Mijatović et al. (2022), we assessed the effectiveness of appeals using three types of questions. Participants evaluated two categories of herbal products described in the vignettes: herbal drops and tinctures used for the prevention or treatment of digestive tract diseases, and herbal balms used for the prevention or treatment of skin inflammations (such as acne and pimples). In the first set of questions, participants rated how (in) effective, (un)beneficial, (un)desirable, and (un)healthy they found the products on a seven-point semantic differential scale (ranging from 1 to 7). The second and third category of questions assessed participants' willingness to use and recommend the described products. Responses for these two categories were rated on a seven-point Likert scale (from 1 – "completely unwilling" to 7 – "completely willing"). Given the high/very high reliability of our scales (α = .87 - .96), we calculated scores for the dependent variables (DV) by averaging: a) all responses on the semantic differential scales for both categories of products (first DV), and b) all responses on the Likert scale for both categories of products (second DV). As an experimental manipulation check, participants were asked to rate the author and the text using two seven-point semantic differential scales (e.g., from 1 – "unconvincing/inconcise" to 7 – "convincing/concise").

The described set of dependent variables was administered twice, in the pretest (Online supplement B) and posttest (Online supplement D) phase of the study. Both times responses were given as described, though the initial question slightly differed. In the pretest, participants expressed their opinions about these types of products in general. In the posttest, herbal products as described in the previously assigned vignette, were provided as examples.

Each set of dependent variables included two buffer items (four in total). These questions measured participants' willingness to try, recommend, and positively evaluate certain pharmaceutical products irrelevant for our study. Buffers were used to desensitize and mask the research focus – scores on these variables were not used in further analyses.

### *Moderator Variables*

Receptivity to pseudo-profound verbalisms was measured using the scale (Gligorić et al., 2022; Pennycook et al., 2015), consisting of 10 statements (e.g., "Science tells us today that the essence of nature is joy") constructed using a "bullshit generator". Participants rated the profundity of statements on five-point Likert scale (1 – "not profound at all"; 5 – "extremely profound"). The measure of receptivity to pseudo-profound statements was obtained by averaging scores from all items. This measure also exhibited high reliability in the present sample (α = .89).

Magical health beliefs were measured using an adapted scale by Lindeman et al. (2000), specifically its Serbian version (Purić et al., 2022), which consists of 10 items (e.g., "If we massage the foot area representing a particular organ, that organ will recover"). Participants rated their agreement on a five-point Likert scale (from 1 – "strongly disagree" to 5 – "strongly agree"). Scores were calculated by averaging responses on all items. The scale demonstrated a high reliability in the current sample (α = .87).

Attitudes towards TCAM were measured with four items (e.g., "Alternative medicine is in many ways better than conventional Western medicine") (Purić et al., 2022). Responses were also given on the five-point Likert scale described above. Very high reliability (α = .93) allowed the scores to be calculated by averaging responses across all items.

Questions about socio-demographic characteristics related to gender, age, education, and participants' health status. Level of education was measured by the number of completed years of schooling, while participants' health status was measured in two ways: by self-reporting the presence of a chronic illness (yes/no) and by rating their general health on a five-point Likert scale (1 – "very bad"; 5 – "very good"). All instruments used to measure the moderator variables described above are provided in Online supplement E.

### *Attention Control Measures*

Lastly, we administered three attention check items embedded in receptivity to pseudo-profound verbalisms, magical health beliefs and attitudes toward TCAM scales. Participants were instructed to mark a specific answer. Data from all participants who incorrectly answered one or more attention checks were excluded from further analysis.

All instruments, materials and syntax for analyses, as well as supplementary files, are available at https://osf.io/u9egj/?view_only=0ad7464624f94002a66037e8fb2c2a98.

## Results

### Manipulation Check

Firstly, we examined the effectiveness of the experimental manipulation by testing whether the two experimental groups and the control group differed on the perceived convincingness/conciseness of the text, and the evaluation of the author. The results indicated that the groups did not differ on either dependent variable: text credibility, $F(2, 163) = 1.61$, $p = .20$, and author evaluation, $F(2, 163) = 2.69$, $p = .07$.

### *The Effect of Type of Appeal on Rating of Fictitious Herbal Products and Willingness to Use and Recommend Them*

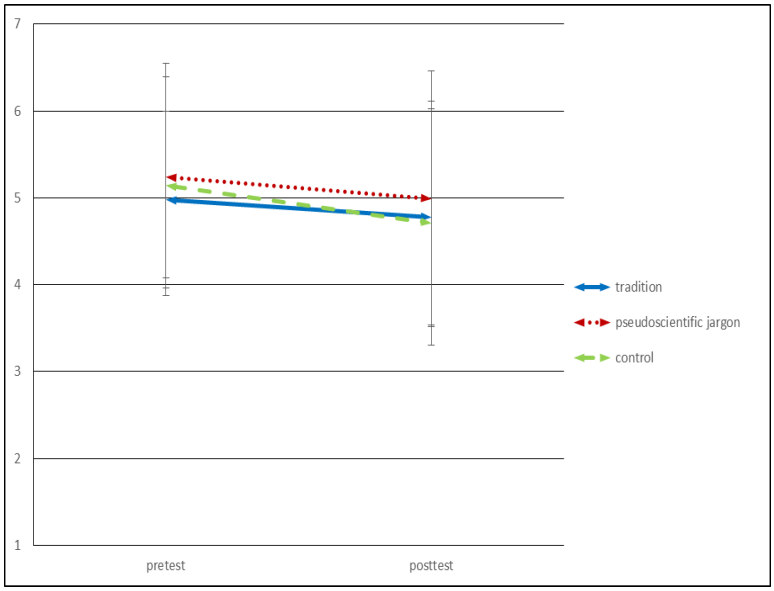
To test the first main hypothesis, we conducted two mixed analyses of variance. The between-subjects factor in these analyses was group membership, i.e., exposure to one of the description methods – appeal to tradition,

pseudoscientific jargon or WHO guidelines. The within-subjects factor was time (pretest vs. posttest), and the dependent variables were the rating of the fictitious herbal product and willingness to use and recommend it. A negative change in scores from pretest to posttest indicated a decrease in willingness and rating of the products following exposure to the vignette, while a positive change indicated an increase.

Unexpectedly, the results showed that there was no significant interaction between the two factors for any combination of the dependent variables (product rating – $F(2, 363) = 2.11$; $p = .12$; use and recommendation – $F(2, 363) = 1.54$; $p = .22$). Thus, change in the dependent variables did not depend on the type of appeals used to describe the product. In both cases, however, a significant effect of the repeated factor was observed (product rating – $F(1, 363) = 35.78$; $p < .001$; use and recommendation – $F(1, 363) = 62.98$; $p < .001$). Thus, when comparing the two measurement time points, there was a change in both dependent variables, but the degree of this change did not depend on how the product was described in the vignette. Unexpectedly, there was a decrease in ratings and willingness to use and recommend in both experimental groups as well as in the control (Figures 2 and 3).

**Moderators of Participants' Responses to Exposure to Herbal Product Advertising**

Although the appeal type did not differentiate participants' responses, in the next step we conducted exploratory moderation analyses to examine whether individual differences were associated with the observed decreases




*Note.* In both figures, solid lines denote the appeal to tradition group, dotted lines denote the pseudoscientific jargon group, and dashed lines denote the control group.

*Figure 2* Average product rating with standard deviations.

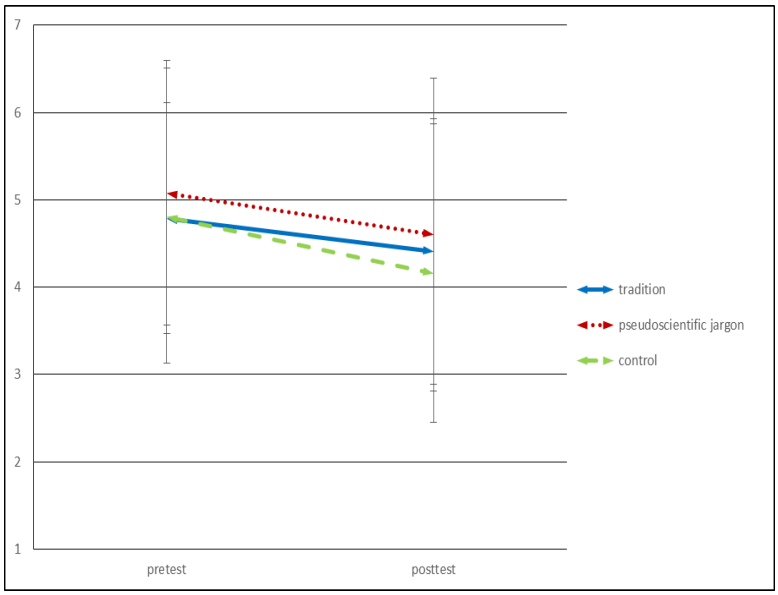



*Figure 3* Average willingness to use and recommend products with standard deviations.

in product evaluations following vignettes exposure. To test the second main hypothesis, we conducted six moderation analyses using multiple linear regression models with interaction terms (predictor × moderator) in JASP (Love et al., 2019).

*Moderators of the Experimental Effects on TCAM Product Ratings*

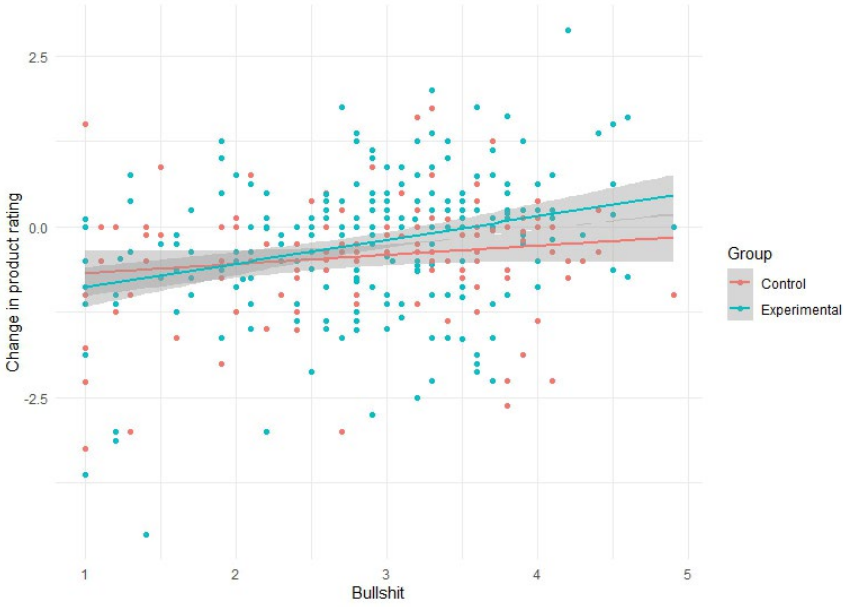
In the first three moderation analyses, the independent variable represented group membership [belonging to the control (0) or any of the experimental groups (1)]. The dependent variable was calculated by subtracting the average pretest rating of the herbal products from the average posttest rating. The green lines and dots in all figures represent experimental groups, while the red lines and dots represent the control group. Given that the observed effect was the opposite of what was expected, the moderation hypotheses (H2a-H2c) were not supported by the data.

In Model 1, the continuous moderator variable was represented by the score indicating the participants' receptiveness to pseudo-profound verbalisms. Although not significant, we observed a trend in the expected direction – the decrease in product ratings was smaller for participants who were more receptive to pseudo-profound verbalisms ($\beta$ = .35, $p$ = .053), $R^2$ = .08 (Table 1, Figure 4).

In Model 2, the continuous moderator variable consisted of scores representing participants' tendencies towards magical health beliefs. Once again, there was a trend toward significance in the expected direction ($\beta$ = .33, $p$ = .07), $R^2$ = .11 (Table 1): a smaller decrease in product ratings, i.e., less of an backfire effect observed across all vignettes among participants more prone to magical health beliefs (Figure 5).

Table 1 *Moderators of the experimental effects on TCAM Product Ratings*

| Model | Variables | *β* | SE | 95% CI | | *p* |
|---|---|---|---|---|---|---|
| | | | | LL | UL | |
| 1 | Group | -.21 | .33 | -1.06 | .23 | .21 |
| | Pseudo-profound verbalism | .13 | .08 | -.03 | .30 | .11 |
| | Interaction | .35 | .11 | -.00 | .42 | .05 |
| 2 | Group | -.19 | .34 | -1.05 | .28 | .26 |
| | Magical health beliefs | .18 | .09 | .02 | .37 | <.05 |
| | Interaction | .33 | .11 | -.02 | .43 | .07 |
| 3 | Group | -.17 | .32 | -.96 | .31 | .31 |
| | TCAM | .01 | .07 | -.06 | .23 | .23 |
| | Interaction | .31 | .09 | -.02 | .35 | .07 |




*Note.* In all figures, the green lines and dots denote experimental groups, whereas the red lines and dots denote the control group.

*Figure 4* Receptiveness to pseudo-profound verbalism and change in TCAM product ratings.

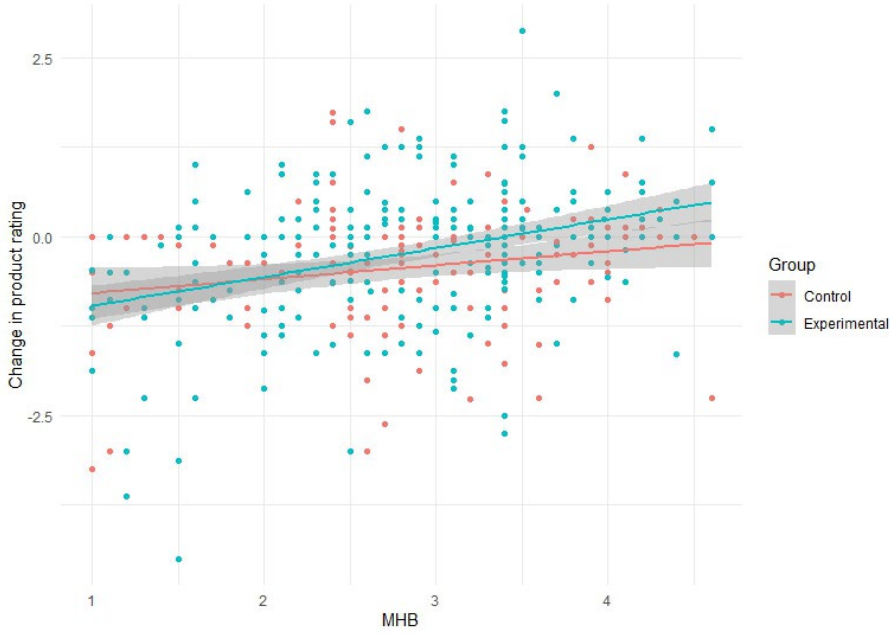



*Figure 5* Magical health beliefs and change in TCAM product ratings.

Finally, in Model 3, the continuous moderator variable was participants' attitudes towards TCAM. Although not significant, the interaction was in the expected direction ($\beta$ = .31, $p$ = .07), $R^2$ = .06 (Table 1), i.e., the decrease in product ratings was smaller among participants with positive attitudes towards TCAM (Figure 6).

*Moderators of the Experimental Effects on Use and Recommendation of TCAM Products*

The next three moderation analyses followed similar logic, the independent variable represented group membership [belonging to the control (0) or any of the experimental groups (1)]. The dependent variable was calculated by subtracting the average pretest from the average posttest measure of willingness to use and recommend the herbal products.

In Model 1, the continuous moderator variable was the score that indicated participants' receptiveness to pseudo-profound verbalism. We observed a significant interaction effect ($\beta$ = .45, $p$ = .013), $R^2$ = .06 (Table 2), but the effect size was small. Thus, a smaller reported decrease in willingness to use and recommend the products occurred among those who were more prone to pseudo-profound verbalisms (Figure 7).

In Model 2, the continuous moderator variable was a score representing participants' tendency toward magical health beliefs. Once again, there was a significant interaction effect ($\beta$ = .48, $p$ = .012), $R^2$ = .05 (Table 2), meaning the observed decrease in willingness to use and recommend the products was smaller among participants more prone to magical health beliefs (Figure 8).

In the final moderation analysis (Model 3), the continuous moderator variable was the score representing participants' attitudes toward TCAM. There was no significant interac-

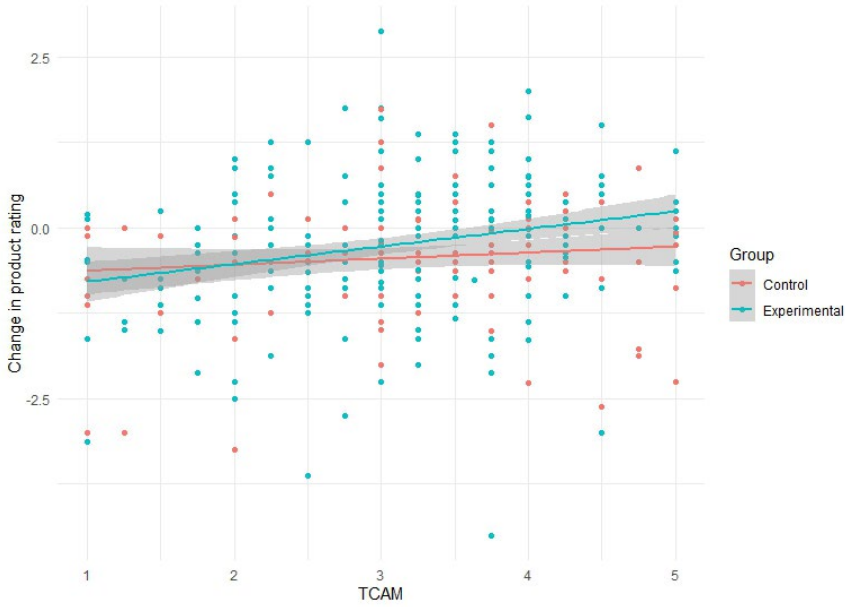



*Figure 6* Attitudes towards TCAM and change in TCAM product ratings.

Table 2 *Moderators of the experimental effects on willingness to use and recommend TCAM products*

| Model | Variables | *β* | SE | 95% CI | | *p* |
|---|---|---|---|---|---|---|
| | | | | LL | UL | |
| 1 | Group | -.32 | .43 | -1.65 | .03 | .06 |
| | Pseudo-profound verbalism | .02 | .11 | -.19 | .24 | .79 |
| | Interaction | .45 | .14 | .08 | .63 | .01 |
| 2 | Group | -.34 | .45 | -1.74 | .02 | .05 |
| | Magical health beliefs | -.01 | .12 | -.25 | .22 | .91 |
| | Interaction | .48 | .15 | .08 | .67 | .01 |
| 3 | Group | -.15 | .42 | -1.21 | .44 | .36 |
| | TCAM | -.01 | .10 | -.21 | .17 | .87 |
| | Interaction | .27 | .12 | -.06 | .43 | .13 |

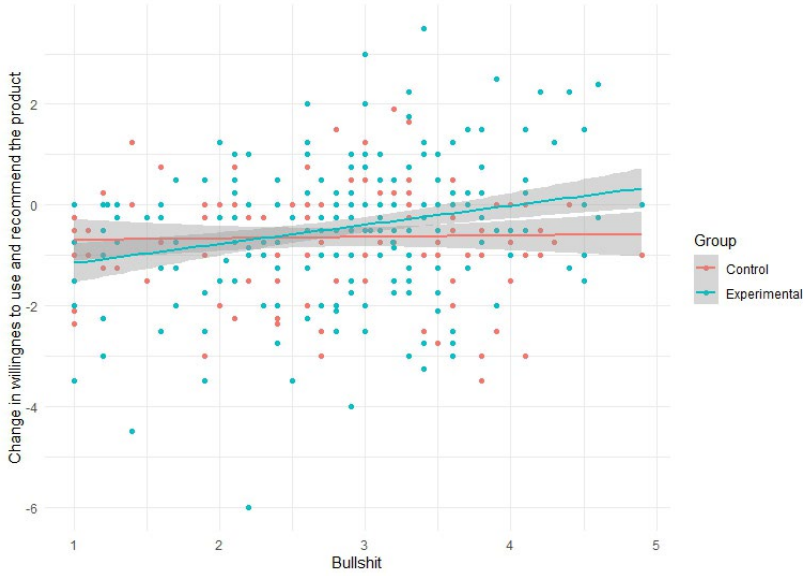



*Figure 7* Receptiveness to pseudo-profound verbalisms and change in willingness to use and recommend TCAM products.

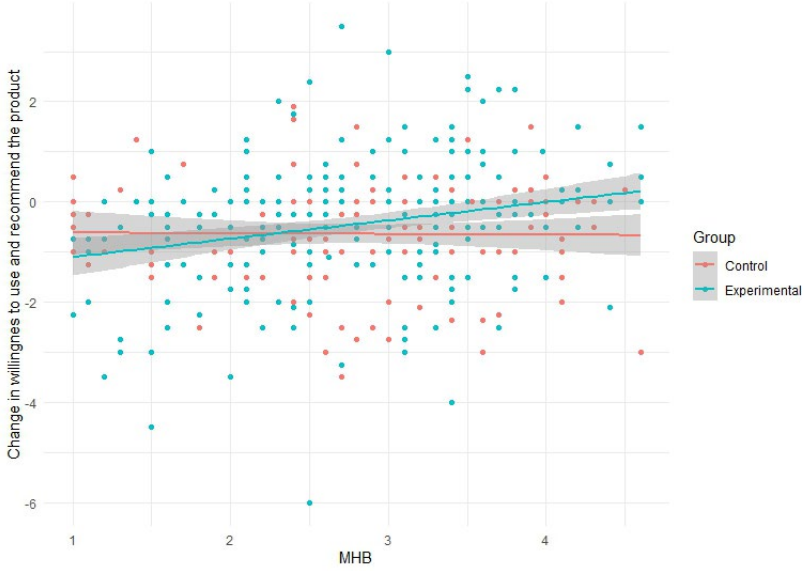



*Figure 8* Fostering magical health beliefs and change in willingness to use and recommend TCAM products.

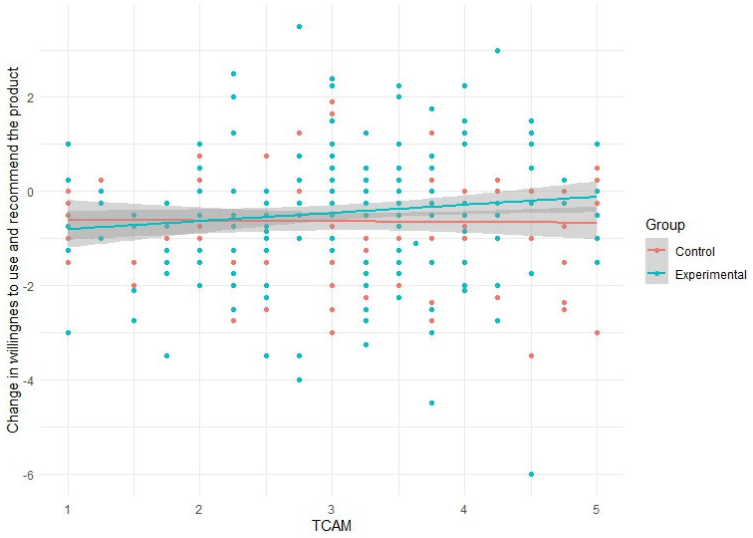



*Figure 9* Attitudes toward TCAM and change in willingness to use and recommend TCAM products.

tion effect of attitudes toward TCAM ($\beta$ = .27, $p$ = .13), $R^2$ = .02 (Table 2): the change in the willingness to use and recommend the products was the same regardless of the initial attitudes towards TCAM (Figure 9).

## Discussion

The aim of this study was to determine whether different ways of describing herbal products (using appeal to tradition, pseudoscientific jargon, or WHO recommendations) would lead to increased product rating and willingness to use and recommend them. Additionally, we examined whether this effect is more pronounced among individuals who are more receptive to pseudo-profound verbalisms, are more prone toward magical health beliefs, and hold more positive attitudes toward TCAM.

### *The Effectiveness of Different Types of Appeals*

Generally speaking, our participants had a favorable attitude toward fictional herbal products even before reading the vignettes. However, an unexpected result was a decrease in product rating and willingness to recommend/use the product after reading the vignettes.

One possible reason can be the slight difference between the pretest and posttest questions. Specifically, in the pretest, participants were asked to evaluate TCAM products for treating certain health issues in general. In the posttest, however, they evaluated products *such as one described* in the vignette. This specificity may have led to the decrease for various reasons: regardless of their general positive attitude toward herbal products, participants may not automatically trust any new

herbal product, they may not currently need a product for that type of health issue, they might feel they do not know enough about it based on a single article, or they may prefer to hear others' experiences with the product. Also, the name of the product and its composition were unknown to participants, which could have increased their skepticism toward it. In line with the trust heuristic – which posits that people view new technologies as less risky when they trust the organizations overseeing their regulation (Siegrist, 2021) – participants may have judged the product as risky because they were unfamiliar with the particular brand. Additionally, when asked about TCAM products in general, participants might have imagined a product they have already used or have been recommended to use, which was not the case here.

We should also note a general distrust in media within the population, particularly toward internet media. Studies have shown that 47.3% of Serbian citizens reported low trust in online news portals, while 21.7% indicated they do not trust them at all (Joković Pantelić & Matijević, 2023). These findings support the interpretation that it is possible for a product – about which a participant has information exclusively from an online portal – to be less appealing than TCAM products in general.

According to the reactance theory, when we recognize persuasive intentions – the feeling that our freedom of choice is somehow being restricted – we tend to do the opposite of what is expected (Miron & Brehm, 2006). Similarly, our participants may have recognized persuasive intent and felt the sentiment of "now I definitely won't", which led to decrease in preference for fictitious herbal products.

Additionally, to construct vignettes that follow the format and length of a typical newspaper report, and to isolate the effects of single appeals, we presented an excessive amount of somewhat repetitive information (the same type of appeal reiterated). This might have turned our intervention into a so-called paradoxical thinking intervention (Hameiri et al., 2014; Hameiri, 2021). In this intervention, using excessive amount of new information congruent with currently held beliefs aims to lead to the realization that these beliefs are irrational. This realization can lead to a paradoxical attitude change (i.e., reversed to what is argued in the message), which was precisely the case in our experiment.

The reactance or paradoxical thinking explanations, however, are not applicable to the decrease observed in the control group since arguments used in this group are in line with WHO (2004) guidelines. The decrease could be a consequence of specific information used to describe the product, i.e., that providing full and unbiased information about the product – a mention of possible negative effects, recommendation to consult a conventional medicine practitioner, as well as restriction of people allowed to use the product – could make people more cautious regarding its use.

Lastly, we also considered whether the predominantly female composition of our sample could have influenced the results, given evidence that women are more likely to engage in TCAM practices (Conboy et al., 2005; Knežević et al., 2024). However, we found no ceiling effects, as average TCAM outcomes were near the scale midpoints. Moreover, baseline TCAM levels would not account for the backfire effect observed across all vignettes, because they would affect all groups equally in an opposite way.

In light of the fact that general interest in TCAM products declined in the posttest, it is not surprising that there was no effect of the type of appeal used in the vignette, since all the possible explanations for such a decline listed above apply equally to both types of

appeals, as well as the control group. Additionally, given that the text was perceived as similarly convincing and the author was evaluated similarly across groups, a comparable decrease regardless of appeal type is unsurprising.

*Individual Differences in the Effects of Appeals*

The backfire effect observed across all vignettes was smaller among the participants more receptive to pseudo-profound verbalisms. This was evident in the willingness to use and recommend the products, while in product ratings, we found a potentially meaningful relationship, albeit not statistically significant ($p < .05$). It may be that individuals receptive to this type of language tend to prefer an intuitive cognitive style (Evans et al., 2020; Pennycook et al., 2015), which leads to uncritical processing of the information in the vignettes and making decisions in a less analytical way. Additionally, one of the vignettes was created using pseudoscientific appeals, which can be considered a specific type of pseudo-profound language (Evans et al., 2020). Although this type of appeal is incomprehensible, participants receptive to this type of language perceive it as profound, making products described using this appeal appear more authentic. Lastly, receptivity to pseudo-profound statements positively correlates with belief in fake news (Pennycook & Rand, 2020), and the presented content can itself be categorized as such.

Similarly, there was less of a decrease, in terms of willingness to use and recommend the products, among participants prone to magical health beliefs, regardless of the appeal type. Since people who are more prone to hold magical health beliefs are also more likely to use TCAM products (Aarnio & Lindeman, 2004), observing the smaller paradoxical effect is in line with previous results.

Finally, no significant effects were found for attitudes toward TCAM, although a trend appeared in product ratings, with participants holding more positive attitudes being less resistant to the paradoxical effects of exposure to appeals, however not below significance threshold ($p < .05$). Although previous studies found moderate to strong correlation between TCAM attitudes and its use ($r = .52$; Purić et al., 2022), our results suggest that it is not a given that this group would be more sensitive (or less resistant, in this case) to the typical pro-TCAM appeals.

## Limitations and Recommendations for Future Research

To compare the effectiveness of different types of appeals, our research presented herbal products using multiple versions of a single appeal in each vignette. As TCAM product reporting typically combines multiple appeals, this might have decreased the ecological validity and potentially triggered a paradoxical thinking effect. Future research could thus vary the number of arguments in vignettes to determine the optimal amount for persuasive impact and identify the "tipping point" at which paradoxical thinking begins to take over.

One of the possible reasons for decrease in all dependent variables, regardless of appeal used, can be the consequence of lack of full comparability between the pretest and posttest measures. Namely, in the pretest, these questions related to the complete category of products, while in the posttest, the participants evaluated herbal products *such as the one described* in the vignette. To avoid the concreteness alone interfering with the effects of each of the appeals used, it is necessary to equalize the level of generality of these questions. Thus, even in the posttest phase, the questions could refer to the entire

category of herbal products, without referring to the products described in the vignettes.

Apart from the improvements in an experimental situation, we also propose that the moderating effects of cognitive reflection (Frederick, 2005) and epistemic credulity (Campbell et al., 2021) could be tested in the future research.

Nevertheless, to the best of our knowledge, this study was the first to experimentally compare the effects of two appeals most widely used in the media in a single, adequately powered design. While creating the vignettes, we made sure they were resembling the real media environment in terms of content, design, and form. We also tested the appeals against an active control group, in which the reporting followed the WHO guidelines. Our results point to a potential backfire effect of the overuse of the appeals observed across all vignettes, which links the literature on health interventions to paradoxical thinking interventions – an interesting avenue for future research.

## Conclusion

The results indicate that there are no differences in the effectiveness of the three types of description of herbal products. Unexpectedly, we observed a backfire effect in both experimental and control groups, which could have originated from the lack of full comparability between the pretest and posttest measures, general distrust in the media, participant reactance, or the paradoxical thinking intervention. Across vignettes, the backfire effect was smaller for product ratings among participants more receptive to pseudo-profound verbalisms, more prone to magical health beliefs, and more positive toward TCAM, while for willingness to use or recommend the product it was smaller only among those receptive to pseudo-profound verbalisms and prone to magical health beliefs, not those with more positive TCAM attitudes. Experimental testing of the effects of different media strategies not only makes us understand them better, but can also be used to develop strategies which help people resist their "predatory" influence.

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