

OPINION INFLUENCES CONTENT IN SOCIAL MEDIA DISCUSSIONS ABOUT 2,4-DINITROPHENOL

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INTRODUCTION

The Toxicological Problem

- ▶ 2,4-dinitrophenol (DNP) uncouples oxidative phosphorylation. It is used for weight loss, even though the FDA banned it for human consumption in 1938.
- ▶ Our current knowledge comes predominantly from case reports of fatal overdoses
- ▶ Online message boards may provide a data on nonfatal DNP use, usage not captured by calls to Poison Control or reports from hospitals.

The Methodological Challenge

- ▶ **Unstructured Text** The text of a social media post is not structured or standardized like a form.
- ▶ **Veiled Language** When discussing sensitive topics, people may obfuscate.

RESEARCH QUESTIONS

- ▶ What substances do users mention when they post about DNP?
- ▶ Do the types of substances mentioned depend on the user's opinion of DNP?

RHETORICAL STANCE

A user's **rhetorical stance** is the user's stated opinion on a topic, not the user's actual or inferred opinion although these all may coincide. On sensitive topics we assume that most people communicate through oblique references.

rhetorical stance	description
for	promotes use of DNP
against	discourages use of DNP
tacit	takes no explicit stance on use of DNP

Table 1: **Rhetorical stances.**

METHODS

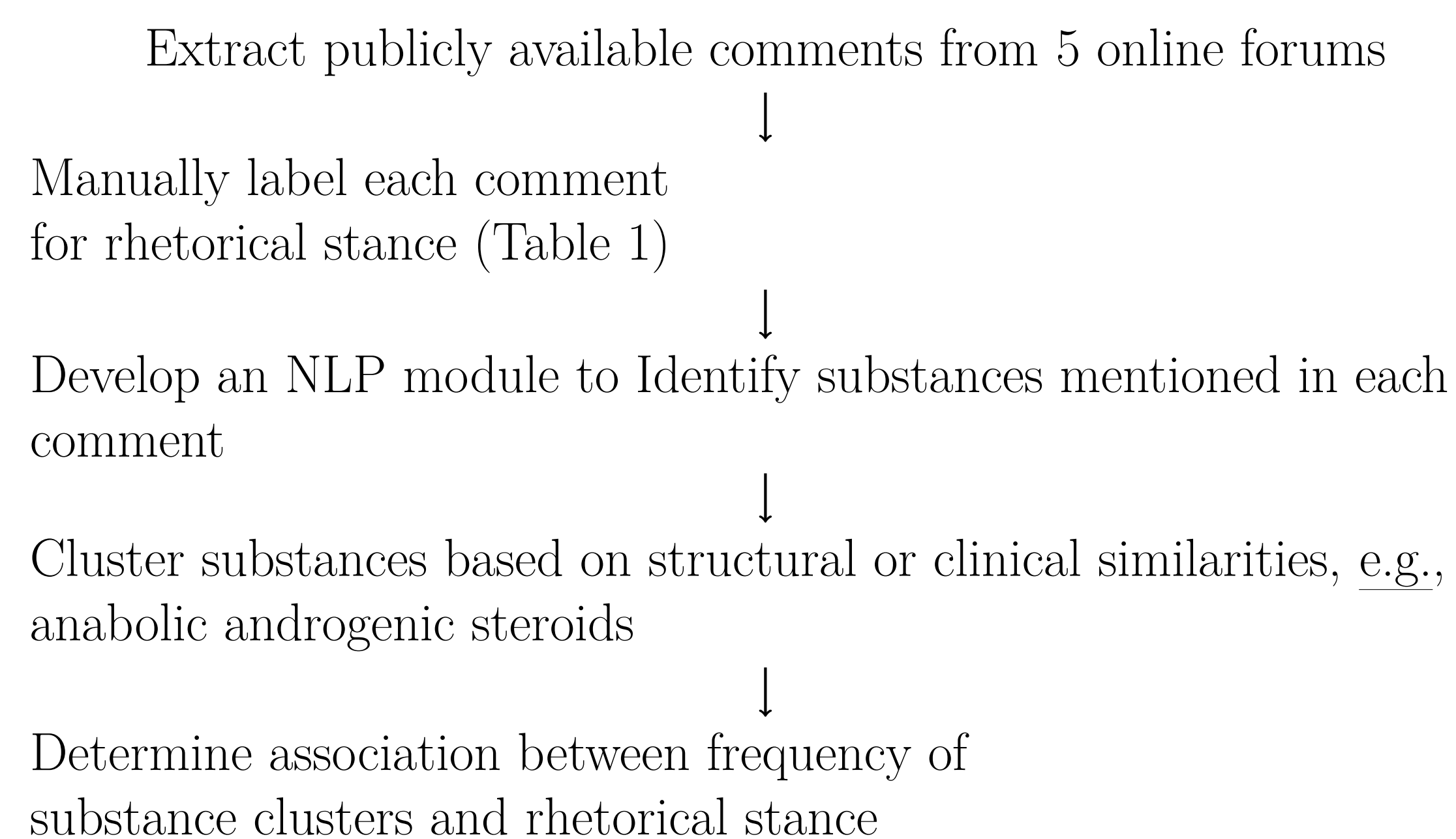


Figure 1: **Study design.**

Statistical Analysis We calculated the significance of the association between the number of times a substance class was mentioned and rhetorical stance with the χ^2 -statistic followed by Tukey's honest significance difference to assess the association between each substance class and rhetorical stance.

RESULTS

Rhetorical Stance	No. of mentions of			p-value
	DNP	All Other Substances	Alternatives to DNP	
For	46	108	26	0.03
Against*	88	220	98	>0.001
Neither	3,996	5353	1613	0.28
Total.	4,130	5681	1737	

Table 2: Association Between Rhetorical Stance and Mentions of Alternatives to DNP. P-values represent statistical significance of row against total as assessed by χ^2 after Bonferroni correction by a factor of 3.

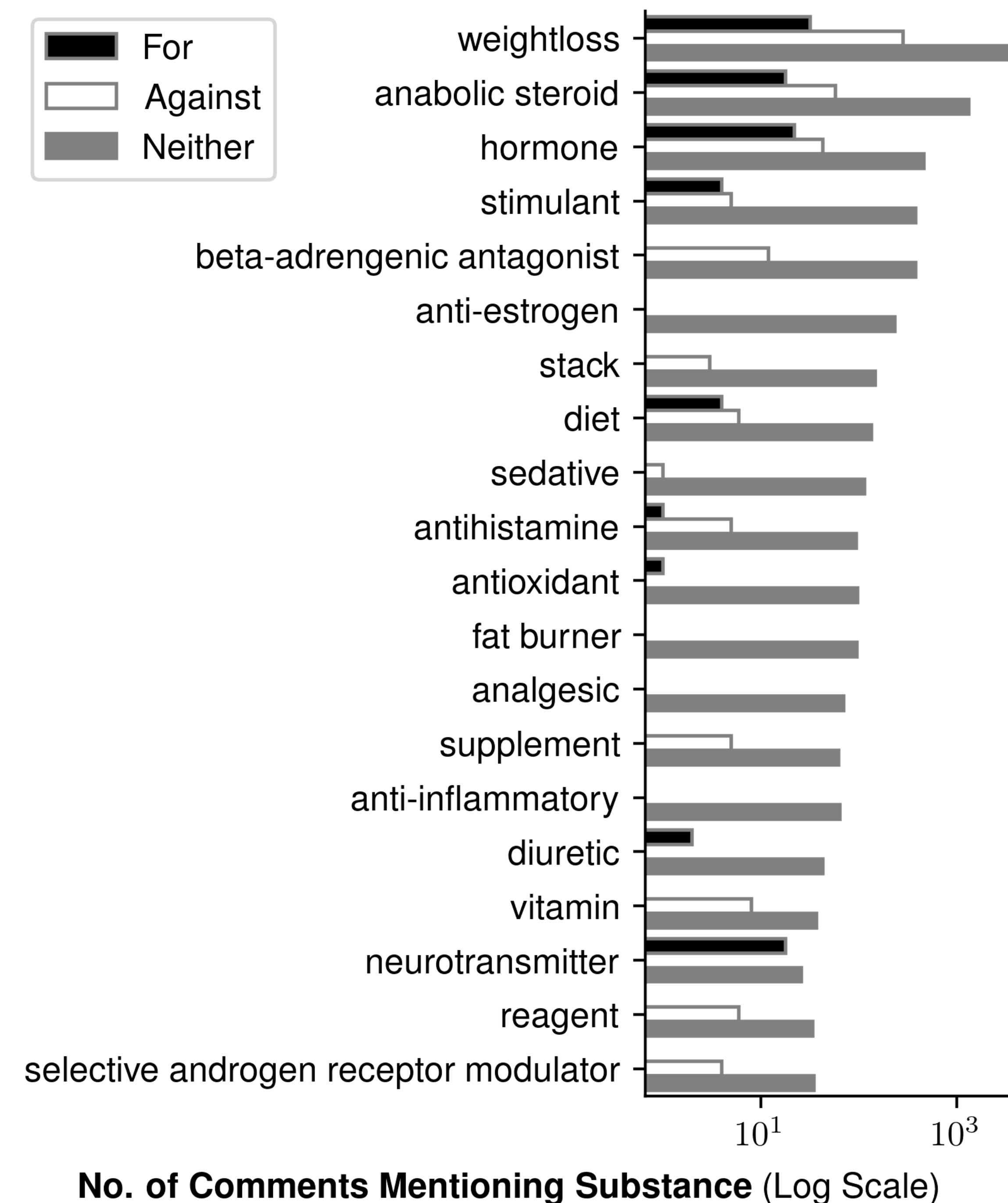


Figure 2: **Count of Substance Mentions by Rhetorical Stance** X-axis denotes number of comments on a logarithmic scale. Y-axis denotes substance groups. Color (hue) of bar indicates rhetorical stance according to legend in upper left.

Substance Class	For	Against	Neither	Total	p-value
Weight Loss	55 (2.7%)	104 (5%)	1,916 (92%)	2,075	0.65
Anabolic androgenic steroid	1 (2.7%)	14 (3.8%)	358 (96%)	373	0.11
Stimulant	4 (1.8%)	14 (6.2%)	208 (92%)	226	0.70
β-adrenergic agonist	12 (5.3%)	16 (7%)	197 (88%)	225	0.03
Fat Burner	1 (2.6%)	5 (13%)	33 (85%)	39	NP
Stack	5 (14%)	1 (2.8%)	30 (83%)	36	NP
Vitamin	1 (2.9%)	1 (2.9%)	33 (94%)	35	NP
Total	79	179	3,235	3,493	

Table 3: **Cross-tabulation of Substance Class Mentions by Rhetorical Stance.** Numbers in parentheses are percentage of row total. P-values represent statistical significance of row against total as assessed by χ^2 after Bonferroni correction by a factor of 7. NP, indicates statistical test not performed.

RESULTS

- ▶ Those who explicitly post against using DNP are mention alternatives twice as frequently as those who past advocating DNP use.
- ▶ Overall, the most commonly mentioned substances are weight loss supplements, anabolic steroids, and hormones.
- ▶ Those who explicitly post a stance for or against using DNP are more likely to mention β -adrenergic agonists, like clenbuterol more than any other substance. They were not more likely to mention stimulants, which are also often used to increase metabolism.

LIMITATIONS

- ▶ Unequal sizes between groups decreased the power of our study. This could be decreased by a model that infers latent rhetorical stance.
- ▶ Our grouping of substances is arbitrary. Some groups reflect mechanism, others effect..
- ▶ We did not consider comments that do not take an explicit stance on DNP but implicate a stance (*e.g.*, many comments did not mention DNP by name and so were considered neutral, though they used approving or disapproving language).

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