روی دیگر نادانی‌سازی صنعتی: آیا پس از افشا واکنش جامعه تغییر کرد؟

رامین سعادت

اعلام استفاده از هوش مصنوعی

در این پژوهش از دستیار هوش مصنوعی کلود (ساختهٔ شرکت آنتروپیک) برای این کارها کمک گرفته شد: نوشتن و آزمودن برنامهٔ جست‌وجو، تطبیق ارجاع‌ها با منبع‌ها، تهیهٔ پیش‌نویس بخش‌ها و نقد استدلال. جست‌وجو را نویسنده اجرا کرد و بسته‌اش در زنودو ثبت شده است. درجه‌بندی منبع‌ها، گزینش و تصمیم‌ها، و مسئولیت متن و خطاها با نویسنده است. منبع‌های دست‌اول (حکم‌ها، مقاله‌ها) هر جا ممکن بود از صفحهٔ خودشان خوانده شد، و مواردی که فقط در سطح چکیده یا گزارش خبری خوانده شد در متن نشان داده شده است.

چکیده

صنایع بارها چیزی گفته‌اند که خودشان خلافش را می‌دانستند. مقالهٔ پیشین این «فاصلهٔ دانستن و گفتن» را در شش حوزهٔ صنعتی نشان داد و سه پرسش را باز گذاشت:

آیا شرکت‌ها می‌خواستند فریب دهند؟

آیا گفته‌هایشان بر باور مردم اثر کرد؟

و وقتی ماجرا افشا شد، چه تغییر کرد؟

این مقاله برای هر پرسش نقشهٔ شاهد موجود را می‌سازد؛ شاهد از جست‌وجوی تکرارپذیر در یک پایگاه (۱۷۵ پرسش، ۳۴٬۷۰۹ اثر) و خواندن منبع‌های کلیدی آمده است. نتیجه نابرابر است:

دربارهٔ قصد، سند و حکم داریم، ولی قصد فریب فقط برای پردیو با اقرار ثابت شده، آن هم برای شرکت و در برابر پزشکان و یک نهاد نظارتی.

دربارهٔ اثر، شاهدی که پیام صنعت را از خود محصول جدا کند کم است و همان هم باور و ادراک خطر را در آزمایش‌های کوتاه می‌سنجد، نه رفتار را.

دربارهٔ پس از افشا، پیامد برای شرکت دیده می‌شود و پیامد برای مردم، با طرحی که اثر خود افشا را جدا کند، نه.

نتیجه این بررسی برای مطالعات نادانی این است که نیمهٔ «سازنده» در نادانی‌سازی مستند است و نیمهٔ «دریافت‌کننده» تقریباً اندازه‌گیری نشده. این نبودِ شاهد در جست‌وجوی ما است و نبودِ اثر را ثابت نمی‌کند.

واژه‌های کلیدی: مطالعات نادانی، آگنوتولوژی، نادانی‌سازی صنعتی، قصد، اثر بر مخاطب، پس از افشا، نقشهٔ شاهد

---

۱. پرسش‌ها از کجا آمدند

این مقاله سومین مقالهٔ مجموعه‌ای است که با بررسی جایگاه آگنوتولوژی در مطالعات نادانی آغاز شد (Saadat, ۲۰۲۶a) و با مقالهٔ پیشین ادامه یافت (Saadat, ۲۰۲۶b). مقالهٔ پیشین شش حوزهٔ صنعتی را بررسی کرد: اوپیوئید، شبکه‌های اجتماعی، مواد شیمیایی، خوراک و نوشیدنی، الکل و تالک. معیار ورود هر مورد ساده بود: جایی که شرکت چیزی می‌دانست و چیز دیگری می‌گفت. در موارد متعدد چنین فاصله‌ای با سند ثابت شد. این همان کاری است که پژوهش دربارهٔ «تردیدسازی صنعتی» از پراکتور و میکلز تا اورسکس و کانوی کرده است: رفتار صنعت را از روی اسناد و اظهارات خوانده (Proctor, ۲۰۰۸; Michaels, ۲۰۰۸; Oreskes & Conway, ۲۰۱۰).

اما اثبات یک فاصله به سه پرسش پاسخ نمی‌دهد و مقالهٔ پیشین خودش این را دید و باز گذاشت.

نخست قصد: از اینکه شرکتی می‌دانست و چیز دیگری گفت نمی‌توان نتیجه گرفت که می‌خواست فریب دهد؛ ممکن است خطا بوده باشد، یا اختلاف علمی واقعی، یا دانشی که در سازمان پراکنده بود.
دوم اثر: آیا گفتهٔ صنعت به مردم رسید و باورشان را عوض کرد؟
سوم پس از افشا: وقتی ماجرا آشکار شد چه تغییری دیده می‌شود، هم در شرکت و هم در مردم؟

---

۲. چرا این پرسش‌ها مهم‌اند

برای حقوق و تنظیم‌گری فرق دارد که شرکتی فقط سکوت کرده یا قصد فریب داشته، و اینکه که فریب بر مردم اثر کرده یا نه. ولی برای مطالعات نادانی مسئله عمیق‌تر است. آگنوتولوژی، به تعبیر پراکتور، مطالعهٔ تولید فرهنگی نادانی است. تولید نادانی دو سر دارد: کسی که می‌سازد و کسی که نادان می‌شود. اگر فقط سر نخست را اندازه گرفته باشیم، آنچه نشان داده‌ایم رفتار صنعت است و نه نادانی. شاید صنعت بسیار کوشیده و مردم هیچ واکنشی نشان ندهند، شاید هم تغییری در مردم رخ داده باشد؛ و این را از روی اسناد صنعت نمی‌توان فهمید. این مقاله می‌پرسد واژهٔ «نادانی‌سازی» تا کجا بر شاهد استوار است.

---

۳. چگونه پاسخ جستیم

کار ما ساختن نقشهٔ شاهد است، نه برآورد اثر. برای هر حوزه می‌پرسیم برای هر یک از سه پرسش چه شاهدی هست و آن شاهد چه چیزی را می‌تواند نشان دهد. شاهد را با جست‌وجوی تکرارپذیر در پایگاه اوپن‌الکس (۱۷۵ پرسش، ۳۴,۷۰۹ اثر) پیدا کردیم و منبع‌های کلیدی را خودمان خواندیم. برای درجه‌بندی سه نردبان ساختیم، هر کدام برای یک پرسش.
نردبان قصد؛ از «فقط ادعا» (سطح ۰) تا «قصد فریب با اقرار یا حکم» (سطح ۳) می‌رود.
نردبان اثر؛ از «شاهدی نیافتیم» (E۰) تا «آزمایشی که اثر یک پیام معین صنعت را بر باور مخاطب می‌سنجد» (E۴).
نردبان پس از افشا؛ از «فقط رویداد» (D۰) تا «اثر خود افشا، با طرح مناسب جدا شده» (D۳).
نردبان‌ها نشان می‌دهند هر شاهد به کدام پرسش نزدیک است.
البته فرضیه‌ای هم داشتیم و آن را در معرض باطل‌شدن گذاشتیم؛ نتیجه‌اش را در بخش ۴.۴ می‌آوریم.
یک هشدار پیش از یافته‌ها: درجه‌بندی را یک نفر انجام داده، جست‌وجو به انگلیسی و در یک پایگاه بوده است، و در آزمونی که روی منبع‌های شناخته‌شدهٔ مستقل از تنظیم جست‌وجو کردیم فقط ۸ از ۱۵ منبع بازیابی شد. پس «شاهد نیافتیم»، اما این نمی‌گوید که «اثری نیست». جزئیات روش، مقیاس‌ها و همهٔ محدودیت‌ها در پیوست «روش کار» آمده است.

---

۴. چه یافتیم

۴.۱ قصد

شاهد دربارهٔ قصد از همه غنی‌تر است، چون دعوا و افشا سند را روی میز آورده‌اند. ولی بالاترین سطح مستند به این بستگی دارد که دربارهٔ چه کسی و در برابر چه مخاطبی بپرسیم.
پردیو روشن‌ترین نمونه است. شرکت در ۲۰۰۷ به برچسب‌گذاری گمراه‌کنندهٔ آکسی‌کانتین «با قصد فریب یا گمراه‌کردن» اقرار کرد، ولی سه مدیر ارشد فقط به جرمی سبک‌تر اقرار کردند و رأی دادگاه می‌گوید آنها به قصد شخصی برای فریب متهم نشده‌اند. در ۲۰۲۰ شرکت به فریب یک نهاد نظارتی اقرار کرد، که دربارهٔ بیماران چیزی نمی‌گوید. قصد شرکت مستند است؛ قصد افراد و قصد فریب بیمار نه.
اکسون‌موبیل نشان می‌دهد پاسخ با مخاطب عوض می‌شود. تحلیل ۱۸۷ متن نشان داد حدود ۸۰٪ اسناد درونی و ۸۳٪ مقاله‌های داوری‌شدهٔ شرکت، تغییر اقلیم را واقعی و انسانی می‌دانستند، ولی فقط حدود ۱۲٪ آگهی‌های مقاله‌مانند روزنامه چنین می‌گفتند

و حدود ۸۱٪ تردید داشتند (Supran & Oreskes, ۲۰۱۷). در ۲۰۱۹ دادگاه نیویورک دید دادستان ثابت نکرده اکسون سرمایه‌گذاران را گمراه کرده است؛ این حکم دربارهٔ سرمایه‌گذاران بود، نه مردم. این دو تناقض ندارند: مخاطب و معیار فرق دارد. در شش حوزه، سطح ۳ با اقرار قطعی فقط برای پردیو مستند است. الگوی غالب سطح ۱ تا ۲ است: صنعت می‌دانست یا پنهان کرد، ولی هیچ منبعی نمی‌گوید «می‌خواست مردم را فریب دهد». این را نباید نبودِ قصد خواند، چون شاهد ما از جایی آمده که دعوا یا افشا سند را آشکار کرده است.

اثر

بیشترین شاهد دربارهٔ اثر، اثر محصول و بازاریابی است، نه اثر گفته شده.

در اوپیوئید بهترین طرح مقایسهٔ ایالت‌هایی است که نسخهٔ سه‌نسخه‌ای داشتند و دیگران: توزیع اکسی‌کانتین در ایالت‌های سه‌نسخه‌ای پس از عرضه حدود ۵۰٪ کمتر بود و مرگ‌های مصرف بیش از حد کندتر بالا رفت (Alpert et al., ۲۰۲۲). طرح قوی است، ولی اثر «عرضه به‌علاوهٔ بازاریابی» را می‌سنجد و نمی‌تواند محتوای گمراه‌کننده را از در دسترس‌بودن دارو جدا کند. در شبکه‌های اجتماعی هم همین است: دو طرح قوی (Braghieri et al., ۲۰۲۲; Allcott et al., ۲۰۲۰) اثر خود محصول را جدا کرده‌اند، نه اثر آنچه شرکت دربارهٔ آن گفته بود.

شاهدی که مستقیم پیام صنعت را بر باور مردم بسنجد کم، و تنها در چند حوزه هست.

در دخانیات چهار مطالعهٔ تصادفی با پیام یا بازاریابی خود صنعت یافتیم، در اقلیم دو مطالعه، و در الکل و نوشیدنی شیرین مطالعه‌ای (Maani et al., ۲۰۲۲) که گزیده‌های واقعی صنعت را به مردم نشان داد؛ همین مطالعه برای دخانیات و اقلیم هم شمرده شده است. در اوپیوئید، تالک، مواد شیمیایی و شبکه‌های اجتماعی چنین مطالعه‌ای نیافتیم.

البته سه نکته را باید کنار این گفت. این آزمایش‌ها کوتاه و برخطاند و باور و ادراک خطر را می‌سنجند، نه رفتار را. شمارش دخانیات حد پایین است، چون غربال ما از شش مطالعهٔ شناخته شدهٔ این حوزه فقط دو تا را آورد. و صفر در اوپیوئید یا تالک دو معنا دارد: یا اثری نیست، یا کسی آزمایش را نساخته است، و شاهد کنونی میان این دو تمایز نمی‌دهد.

یک یافتهٔ آزمایشی از خود شمارش مهم‌تر است: اثر یکنواخت نیست. در آزمایشی دربارهٔ اقلیم، پیام گمراه کننده میانگین باور را اندکی و ناپایدار جابه‌جا کرد، ولی مخاطب را دوقطبی کرد: حامیان قوی بازار آزاد در هر چهار سنجه کاهش یافتند و حامیان کم‌رمق گرایش به افزایش داشتند (Cook et al., ۲۰۱۷). پیام آن آزمایش از وب‌سایتی غیرصنعتی آمده بود، پس اثر پیام صنعت شمرده نمی‌شود؛ ولی نشان می‌دهد هر برآورد واحد «اثر بر عموم» گمراه‌کننده است. Maani و همکاران (۲۰۲۲) هم اثر را در کم‌دانش‌ها قوی‌تر و در پردانش‌ها ضعیف‌تر یافتند.

پس از افشا

پس از افشا، رویدادهای شرکتی فراوان‌اند: اقرار، تسویه، حکم، خروج از بازار.

پردیو در ۲۰۱۸ تبلیغ اوپیوئید به پزشکان را متوقف کرد،

بایر اعلام کرد فروش راندآپ برای باغ و چمن در آمریکا را پایان می‌دهد،

و جانسون‌اندجانسون فروش پودر بچهٔ تالک‌دار را متوقف کرد.

اینها رویدادند، نه اثر؛ و هر کدام می‌تواند از ملاحظهٔ دعوا یا مالی آمده باشد. خروج از محصولی که سهمش کوچک است برای شرکت ارزان است: پودر تالک ۴۲۰ میلیون دلار از ۷۶.۵ میلیارد دلار درآمد جانسون‌اندجانسون بود؛ پس «خروج» را نشانهٔ «پذیرش» نمی‌خوانیم.

پیامد برای مردم بیشتر تک نقطه یا آمیخته با رویدادهای دیگر است. پس از انتشار اسناد فیس‌بوک در ۲۰۲۱، کاربران روزانهٔ شرکت برای نخستین بار در تاریخ آن اندکی کاهش یافت، ولی مدیران علت را رقابت و فشار آگهی گفتند (Hayes, ۲۰۲۲). در پژوهشی بر قربانیان نشت داده‌های کمبریج آنالیتیکا (که نشت داده بود و افشای رفتار فریبنده نبود) واکنش قربانیان در آغاز

قوی‌تر بود، ولی اثرها کوچک بود و پس از شش ماه تفاوت‌ها از میان رفت (Schlackl et al., ۲۰۲۵). و پس از تسویهٔ کنتاکی با پردیو، هزینهٔ ترویج رقیب‌ها برای همان پزشکان بالا رفت (Tan & West, ۲۰۲۳): تسویهٔ یک شرکت ترویج را در بازار کم نکرد. در هیچ‌کدام طرحی که اثر خود افشا را از رویدادهای هم‌زمان جدا کند (D۳) نیافتیم.

طبیعی‌ترین آزمایش در دخانیات است. حکم ۲۰۰۶ دادگاه آمریکا شرکت‌های سیگار را به بیانیه‌های اصلاحی الزام کرد که از ۱ ژوئیهٔ ۲۰۲۳ نمایش داده شد: مواجههٔ الزامی با تاریخ مشخص. در جست‌وجوی ما پژوهشی دربارهٔ پیامد آن رویداد بر باور مردم نیامد. آزمایش‌هایی هست که خود پیام‌های اصلاحی را سنجیده‌اند؛ در یکی دانش و باور سیگاری‌ها بهتر شد ولی در یک هفته به پایه برگشت (Smith et al., ۲۰۱۱). این آزمون پیام است، نه آزمون رویداد افشا.

سرنوشت فرضیه

فرضیه سه ادعا داشت. ادعای نخست می‌گفت آزمایش دربارهٔ پیام صنعتی، جز در اقلیم، در هیچ حوزه‌ای که رفتار شرکت تا سطح ۲ یا بالاتر مستند است بیش از دو مطالعه ندارد. این ادعا رد شد، چون دخانیات چهار مطالعه دارد. شکل بازنویسی‌شدهٔ آن (آزمایش هست جایی که پیام عمومی است و نیست جایی که پیام خصوصی و یک‌به‌یک است) را هم با قاعده‌ای پیش‌ثبت‌شده آزمودیم و رد شد، چون اقلیم دو مطالعه داشت؛ ولی این رد به بازیابی ناقص جست‌وجوی ما حساس است.

دو ادعای دیگر با شاهد ما سازگارند و آزمایش‌شده نیستند: اثر پیام صنعتی بر مخاطب یکنواخت نیست و به تعهد پیشین او بسته است؛ و پس از افشا پیامد شرکتی دیده می‌شود ولی پیامد مخاطب با طرح علّی نه. هر کدام را یافته‌ای می‌تواند نادرست درآورد، مثلاً آزمایش‌هایی که اثر یکنواخت نشان دهند، یا پژوهش پیامدی دربارهٔ بیانیه‌های اصلاحی دخانیات که اثر روشن بر مخاطب نشان دهد.

---

۵. این یافته‌ها برای مطالعات نادانی چه معنا دارند

نخست، نادانی‌سازی دو نیمه دارد و نیمهٔ دوم تقریباً اندازه‌گیری نشده است. دربارهٔ آنچه شرکت‌ها دانستند، گفتند و پنهان کردند اسناد فراوان داریم؛ دربارهٔ آنچه مردم به‌خاطر آن باور کردند یا نکردند آزمایش‌های کوتاه در چند حوزه. پس بر اساس شواهد کنونی، گفتن اینکه صنعت «نادانی ساخت» ادعایی دربارهٔ رفتار صنعت با اثری اندازه‌گیری نشده است. پیشنهاد ما این است که حوزه دو چیز را از هم جدا بنویسد: تلاش برای نادانی‌سازی، و نادانیِ ساخته‌شده در عمل.

دوم، قصد، رفتار و اثر سه چیزند. اگر نادانی‌سازی را به قصد گره بزنیم، در شش حوزهٔ ما فقط یک مورد با اقرار از آزمون می‌گذرد. اگر به اثر گره بزنیم، شاهد کم است. شاید لازم باشد حوزه این سه را در تعریف و در ادعا جدا نگه دارد، و هر ادعا را با شاهد مناسب خودش پشتیبانی کند.

سوم، نادانی یکنواخت نیست. دست‌کم در دو آزمایش اثر پیام به تعهد پیشین و دانش مخاطب بسته بود. پس پرسش «نادانی چه کسی؟» جزء پرسش نادانی‌سازی است، و میانگین کل جامعه ممکن است چیزی را که برای زیرگروه‌ها رخ می‌دهد پنهان کند.

چهارم، بازسازی نادانی. عنوان کتابی که واژهٔ آگنوتولوژی را در آن معرفی کرد «ساخت و بازسازی نادانی» است (Proctor, ۲۰۰۸). افشا یکی از شکل‌های بازسازی است. تا جایی که یافتیم، بازسازی در سمت شرکت دیده می‌شود (اقرار، تسویه، خروج) و در سمت مردم نه. یعنی نه تنها ساخته‌شدن نادانی، بلکه ترمیم آن هم در سمت مخاطب اندازه‌گیری نشده است.

---

۶. پرسش‌هایی که اکنون پیش رویمان است

۱. ردیاب باور برای هر حوزه: اقلیم از ۲۰۰۸ ردیاب دارد (Leiserowitz et al., ۲۰۲۵) و بقیه نه. پرسش‌های سالانه دربارهٔ باور به ادعاهای مشخص صنعت این شکاف را می‌بندد.

۲. ارزیابی بیانیه‌های اصلاحی دخانیات با گروه مقایسه: مواجههٔ الزامی با تاریخ مشخص، طبیعی‌ترین آزمایش برای اثر افشا بر باور.

۳. پژوهش رویدادی پیرامون افشا: برای ۲۰۰۷ و ۲۰۱۹ تا ۲۰۲۰ (اوپیوئید)، ۲۰۲۱ (شبکه‌های اجتماعی) و ۲۰۰۶ (دخانیات) چنین پژوهشی نیافتیم.

۴. جداکردن محتوا از عرضه: طرحی که تبلیغ گمراه‌کننده را از در دسترس بودن دارو جدا کند، مثلاً تغییر قانونی در برچسب با عرضهٔ بی‌تغییر.

۵. آزمایش‌های بیشتر با پیام صنعتی روی مخاطب‌هایی با تعهد پیشین متفاوت، بیرون از اقلیم.

۶. آیا نبودِ آزمایش دربارهٔ پیام‌های خصوصی و یک‌به‌یک، مثل اوپیوئید و تالک، نشانهٔ نبودِ اثر است یا نبودِ پژوهش؟ پاسخ طرحی پیش‌ثبت‌شده می‌خواهد و مرور نظام‌مند با کدگذار دوم.

سخن پایانی

پرسش آغازین این بود که آیا فاصلهٔ دانستن و گفتن، به نادانی مردم می‌رسد. پاسخ امروز ما این است که سوی شرکتیِ این زنجیره مستند است و سوی مردمیِ آن در بیشتر حوزه‌ها اندازه‌گیری نشده، و نمی‌دانیم این خلأ از نبودِ اثر است یا نبودِ پژوهش. «شاهد نیافتیم» با «اثری نیست» یکی نیست.

پیوست فنی. روش کار در این مقاله

این پیوست به انگلیسی است. فرضیه و پیشینه (بخش A۰)، روش و مقیاس‌ها و آزمون بازیابی (A۱)، شاهد تفصیلی هر سه پرسش (A۲ تا A۴) و آزمون فرضیه، دستور کار و محدودیت‌ها (A۵) در آن آمده است. برای دیدن اینکه «شاهدی نیافتیم» تا چه اندازه می‌تواند به معنای «شاهدی که وجود داشت را نیافتیم» باشد، بخش‌های A۱.۳ و A۵.۵ را ببینید. جدول سطح قصد در A۲.۴ و جدول شاهد به تفکیک حوزه در A۳.۳ است.

Appendix: Methods

This appendix holds the technical detail that was taken out of the main text: the hypothesis and background (A0); the method, scales and recall test (A1); the detailed evidence for each of the three questions (A2 to A4); and the test of the hypothesis, the research agenda and the limitations (A5). Section numbers begin with "A" so that they cannot be confused with the sections of the main text.

A0. Hypothesis and background

The previous paper (Saadat, 2026b) examined six industrial sectors using the criterion of the "gap between knowing and saying": cases in which a company knew one thing and said another. The question matters for legal liability and regulation, because the legal and policy consequences differ according to whether a company merely stayed silent or intended to deceive, and according to whether the deception affected the public. That paper showed that the gap is documented in many cases, but it left three things open. First, one cannot move from a "gap" to "intent", and that paper itself slipped from "knowing" to "wanting" in three places: in the sentence of its introduction saying that the documents show what the industry "did and wanted", in its section 2.1, which cites Lunchables as evidence of "the company's intention", and in its section 2.3, which attributes Purdue's plea to "deceiving physicians and consumers". Second, what people believed and did. Third, what happened after disclosure.

As far as we have read, research on "industrial doubt-making" can be seen in three strands. The first reads industry behaviour from documents and statements: from Proctor (Proctor, 2008, 2011), Michaels (Michaels, 2008) and Oreskes and Conway (Oreskes & Conway, 2010) to Goldberg and Vandenberg's list of 28 strategies (Goldberg & Vandenberg, 2021) and the analysis of ExxonMobil's statements (Supran & Oreskes, 2017). The second measures the audience experimentally; its best-known examples are mostly in climate, such as the effect of a scientific-consensus message on belief (van der Linden et al., 2015) and the effect of "inoculation" against doubt-making arguments (Cook et al., 2017), and in tobacco there are also experiments using industry messages and marketing. The third estimates the effect of supply and marketing on behaviour and outcomes without measuring belief in the industry's message: in opioids (Alpert et al., 2022; Hadland et al., 2019; Tan & West, 2023) and social media (Allcott et al., 2020; Braghieri et al., 2022).

These three strands have rarely been connected. The first says what the industry did; the second and third say what happened to the audience or to behaviour; and research that ties the same documented industry message to the audience's belief or behaviour is, outside tobacco and climate, rare. This is our impression from the map in sections A2 to A4 and does not claim to

be a systematic review. This paper adds no new primary research to these strands; it builds a map of the connections between them and asks where the connection exists and where it does not.

The paper pursues three questions. First, intent: when the gap is documented, how far can one conclude that the company wanted to deceive, and whose intent, towards which audience? Second, effect: is there evidence that an industry statement affected the audience's belief or behaviour? Third, after disclosure: once a practice became public, what change is seen, in the company and in the public? The intent question is descriptive and has no hypothesis; the hypotheses concern the other two questions.

Our guiding hypothesis originally had three separate claims, each of which a piece of evidence could falsify. The first claim was asymmetry: apart from climate, in no sector where company conduct is documented at Level 2 or above are there more than two studies attributing audience belief or behaviour to an industry message (an experiment testing the effect of a specific industry message on the audience, labelled E4; section A1.5). This claim was rejected by the evidence, because tobacco has four studies (section A3.4), and we set it aside. The other two claims remain.

The heterogeneity claim says that the effect of an industry message on the audience is not uniform and depends on prior commitment. The evidence for this claim is thin: two experiments, one of which is not an industry message (section A5.1).

The after-disclosure claim says that a consequence of formal disclosure for the company (a plea, a ruling, a settlement or market exit) is visible, but a consequence for the audience, in a design that isolates the effect of disclosure itself (D3), is not found in these sectors; audience outcomes with weaker designs (D0 to D2) do exist. We call the corporate and the audience consequence the "two sides of one coin": the industry side is available through disclosure, courts and fines, while the audience side, with a causal design, is not. These two claims are hypotheses, not findings; the evidence that would falsify them is given in section A5.1.

The paper is a map and a tool. It does not say whether industry affected the public. It asks what evidence exists, what that evidence can show, and where it is empty.

A1. Method

This paper is an evidence map, not an estimate of effects. For each sector it asks what evidence exists on the three questions and what that evidence can show. Section A0 set out the three questions and a hypothesis that can be tested against the evidence. Each finding in the later sections is only as credible as the method by which we found and graded the evidence; so, before turning to the evidence, we say which sectors we examined (A1.1), how we searched (A1.2), how reliable the search is (A1.3), what we do not report (A1.4), which scales we grade with (A1.5), and what limits the method has (A1.6).

A1.1 Sectors

Six sectors come from the previous paper: opioids, social media, chemicals (C8 and glyphosate), food and drink, alcohol and talc (Saadat, 2026b). Tobacco is the reference, because the usual lessons of this field come from it. ExxonMobil is included as a comparison sector, because experiments on audience belief in response to its messages were known to us and we initially thought the other sectors had nothing of the kind. That assumption was rejected

in section A3.4, but ExxonMobil's comparative role remains. Supplements were set aside because in the previous paper no source met the inclusion criterion. Vaccines and positive thinking appear only in the discussion, as borderline cases, and are not in the tables.

A1.2 Search

We ran the search with a repeatable program in the OpenAlex database. The program version, search strings, request addresses and counts are recorded in the frozen package on Zenodo (Saadat, 2026c; https://doi.org/10.5281/zenodo.23878600). The post hoc screens and the coding of experiments testing industry messages are given in a separate record (Saadat, 2026d; https://doi.org/10.5281/zenodo.23882692).

Structure. Each query was built from two groups of terms joined by "AND", each group having at most three terms. The first group holds sector terms (for example, the name of a company or substance) and the second holds terms from one of three loops: intent (internal documents, concealment, misleading), effect on the audience (public belief, experiment, natural experiment) and after disclosure (public trust, litigation, corrective statement). In addition, general queries (for example, "manufactured doubt" with "experiment") and audience-centred queries (for example, "climate change" with "randomised trial") were added. The total is 175 queries. The search covered titles and abstracts for the years 1990 to 2026, ranked by citation count, with a ceiling of 1000 works per query. The first run used a ceiling of 200, and 49 of the 175 queries (28%) hit it; we therefore discarded that run and ran the search again with a ceiling of 1000. In the official run, 24 of the 175 queries (14%) still hit the ceiling, and all of them had more than 1000 results; for these only the 1000 most-cited works were kept, so recent and little-cited works are lost in those queries. The largest were the general climate and social media queries (tens of thousands of results).

Technical limitations that shaped the design. The database restricts queries with more than five logical operators and truncates them without any notice. In a test on 31 October 2026, one large food query returned 562 results, whereas the five-operator pieces of the same query returned 1797. All queries were therefore split into pieces of at most five operators, and the four earlier runs, which had used longer queries, were discarded. Quoted phrases in this database require an exact match, so morphological variants (for example, "randomized" and "randomised") were listed separately. A work without an abstract is found only by title matching.

Result of the official run. The official run returned 34,709 unique works from 175 queries (run date: 1 November 2026). The frozen package contains the raw responses, the program with the key left blank, and a hash list of every file.

A1.3 Recall test

To test whether the search finds known sources, we chose 14 seed sources and separated those used in designing the queries (7 sources) from a hold-out group (7 sources). 13 of the 14 sources were in the results (tuning group 7 of 7, hold-out group 6 of 7). The missing source is a short letter (Leung et al., 2017) that has no abstract, and we did not find it with the structure of our search.

Two caveats shrink this figure. We wrote the titles of the seed sources from memory, and the recall of each was checked by title matching in the results. The hold-out group is not clean

either: we had seen two of the sources before tuning the queries, and the term “mislead” was added after one of the sources (Petticrew et al., 2018) was missed. We therefore read 13 of 14 as the recall of known sources, not as an estimate of the recall of the whole literature.

Second test. After the run, we searched the results of the official run, by DOI and title, for 28 sources that appear in the text of the paper or were checked for it. 13 of these 28 sources are the seeds of the first test and played a part in tuning the queries; so this test is independent only for the other 15 sources. Of these 15, 8 were in the results (53%) and 7 were not. The absent ones were: the study of marketing payments to physicians and subsequent prescribing (Hadland et al., 2018), the study of the effect of the prescribing guideline (Goldstick et al., 2021), the fossil-fuel divestment experiment (Schwartz et al., 2024), the study of corporate funding and polarisation on climate (Farrell, 2016), Benbrook’s (2019) paper on glyphosate, the study of tobacco documents on ultra-processed food (Schmidt, 2026), and the MACH source. If the seeds are counted too (12 of the 13 seeds among these 28 were found, because Leung et al., 2017 was not), the figure becomes 12 + 8 = 20 of 28, but we do not treat it as the main report, because it counts the seeds twice. 53% is much lower than 13 of 14. This gap is consistent with the queries having been tuned on the seed group, but we do not know its cause. A caveat: we brought in these 15 sources ourselves, by manual search or from the previous paper; so the figure shows how much of the author’s known list the protocol captures, not how much of the literature.

A1.4 What we do not report

We give no figure for how many of the 34,709 works are relevant to our questions. A keyword screen (scoring based on terms such as “internal documents” and “randomised trial”) brought only 3 of the 13 seed sources into the top scoring band, and only 2 reached the coding set. At least part of this low figure arises because the most important studies on the effect side lack industry vocabulary (for example, the economics paper on opioids in states with triplicate prescription programmes). We therefore do not treat the screen as a tool for estimating counts. A second screen, post hoc, was built after seeing the results of the official run so that experiments on industry messages (E4) could be counted: a search for sector terms and experimental-design terms in the titles and abstracts of the 34,709 works, with a ceiling of 80 works per sector. We recorded the decision rule for the rewritten form of the first claim (public message versus private message) before seeing the candidates from the non-tobacco sectors; we had seen tobacco earlier, and the first claim in its original form had already been rejected with it (2 November 2026, 09:06 London time; the time the file was recorded in the project). Coding was at the abstract level and by one coder, and the decisive studies were checked on the publisher’s page or full text. A work without an abstract is seen in this screen only if its title matches the terms. The program for the two screens, the list of candidates, the final coding and the original text of the decision rule are in version 2 of the Zenodo package (Saadat, 2026d). For every result that appears in the tables we have read the source itself (page, abstract or full text; each table says which). Items we could not access are marked “not read” in the same table. The search brings us to the evidence; selection and grading are the coder’s work, and the search does not replace them.

A1.5 Three scales

One person did the grading. Because there is no second coder, we state the rules explicitly so that a reader can retest the same grade. Each scale is ordinal and the steps are not equal in size.

Intent (Level 0 to 3). The definition and rules are given in section A2.2. Each row has three separate columns: unit (company or individual), audience, and highest evidence.

Effect on the audience (E0 to E4).

- E0: no evidence was found in this search.
- E1: an internal document that shows the effect the company intended. This is "intended effect", not effect; it is never counted as an effect.
- E2: a descriptive measurement of exposure or belief, cross-sectional or correlational, not attributed to an industry action.
- E3: a quasi-experimental or natural-experiment (or randomised) design on behaviour or outcome that identifies the effect of an exposure (supply, marketing or the product itself) but cannot separate the deceptive content from the exposure itself.
- E4: an experiment or design (the unit of counting is the study; a study with several experiments, such as Maani et al., 2022, is counted once) that attributes to a specific industry message (what it said or a genuine excerpt of it, or an element of its marketing) an effect on belief, risk perception, attitude or intention regarding that same message. Health or anti-industry messages, warnings, corrective statements and non-industry disinformation do not count. The "strict" count takes only the industry's message or excerpt, and the "with marketing" count also includes elements such as packaging and names.

The separated-object rule. This scale measures the closeness of the evidence to the second question, the effect of what industry said; it does not measure the statistical power of the design. We therefore write every E3 and E4 with the object that the design separates: "message", "supply and marketing" or "product". Only E4 with the object "message" answers the second question. A randomised design on the effect of a product (for example, deactivating Facebook) receives E3 (product), however strong it is, because what it isolated is not the message.

After disclosure (D0 to D3).

- D0: only an event (plea, ruling, disclosure) and the company's response, with no outcome measurement.
- D1: a descriptive outcome at several time points, without comparison.
- D2: an outcome with a comparison or design, but mixed with simultaneous policy events.
- D3: the effect of a disclosure event, isolated with an appropriate design.

In D, a disclosure event (plea, trial, leaked documents) is separated from a policy event (for example, a Centers for Disease Control and Prevention guideline), because only the former answers the third question. A list of confounders is also recorded for each row.

Additional field. "Is the harm contested?" (yes or no). This field exists to prevent a genuine scientific dispute (for example, glyphosate) from being read as the same thing as established harm.

A1.6 Validity and limits of the method

- There is one coder and no second coder. The rules above are written so that the grading can be retested.
- We chose the seed sources ourselves, and they are not representative of the literature.
- The search was in English and in one database. A work without an abstract is found only if its title matches the terms; a work outside this database or not matching these terms is lost.
- We built the E and D scales for this paper, and they have not been tested elsewhere.
- Recall of independent known sources was 53% (8 of 15); so "there is no evidence" may mean "we did not find the evidence".

With the sectors, search, scales and limitations clear, we come to the first question. Section A2 asks: when the gap between knowing and saying is documented, how far can one move from it to intent? For each sector it shows the highest level of intent that the evidence allows.

A2. Intent: did the industry want to deceive?

The previous paper (Saadat, 2026b) set the "gap between knowing and saying" as the criterion for including cases, and gave each piece of evidence two labels, for source and for proof. We do not repeat them. The question of this section is different: when such a gap is documented, how far can one move from it to intent to deceive? The gap is necessary for intent to deceive, but it is not sufficient. A gap can also arise from error, scientific dispute, knowledge dispersed within an organisation, or silence without any statement.

A2.1 Three questions before grading

Who? The unit of analysis is the company or the individual. Judge Jones's ruling in the Purdue Frederick case (2007) separates the two explicitly. The company pleaded guilty to misbranding OxyContin "with intent to defraud or mislead". Three senior executives pleaded guilty to a lesser offence, "solely as responsible corporate officers", and the ruling states that they were not charged with personal knowledge of the misleading labelling or with personal intent to defraud (United States v. Purdue Frederick Co., 2007). The federal prosecutor also told the Senate that this lesser offence "does not require proof of intent or actual knowledge on the part of corporate officers" (Brownlee, 2007). So the absence of individual intent in the case is not a finding of the court; it is a product of the form of the charge. The company's intent is documented; the individuals' intent is not.

Towards whom? A company receives different legal answers in respect of different audiences. For ExxonMobil, a content analysis of 187 documents showed that about 80% of internal documents and 83% of peer-reviewed articles took climate change to be real and human-caused, but only about 12% of the company's newspaper advertorials said so, while about 81% expressed doubt (Supran & Oreskes, 2017). In 2019 a New York court found that the prosecutor had failed to prove, by a preponderance of the evidence, that Exxon had misled a reasonable investor about the financial risks of climate change (CNBC, 2019); that ruling concerned investors, not the public. The two findings do not contradict each other, because the audience and the standard differ. Purdue also pleaded guilty in 2020 to deceiving a regulatory agency (U.S. Department of Justice, 2020), and that says nothing about patients.

By what standard? A court answers a legal question by a legal standard. That standard is not the scientific standard of "what the evidence shows". We read each ruling for exactly as much as it says.

A2.2 The four-step ladder

We grade each case by the highest step that the source itself documents, not by what we infer:

- **Level 0:** claim only (a case without a ruling, or a public statement contradicting the science without an internal document).
- **Level 1:** documented knowledge (an internal document or study showing the risk), with or without a statement to the contrary.
- **Level 2:** documented coordinated or concealing conduct (hiding a role or funding, non-publication, coordinated influence).
- **Level 3:** documented intent to deceive, through a plea or ruling or a phrase that the source itself uses about intent.

This scale is ordinal and the steps are not equal in size. Each row has three separate columns: unit, audience and the grade of the highest evidence. A claim without a ruling stays at Level 0. A first-instance court ruling is graded but marked "not final". A secondary source is also marked as such. One person did the coding.

A2.3 A worked example: Purdue

This is the best-documented case, and it shows how far grading depends on the unit and the audience. The agreed statement of facts in the 2007 case records that company representatives told physicians that OxyContin was less addictive, less subject to abuse and diversion, and produced less tolerance and fewer withdrawal symptoms, while the company's own research showed that about 68% of the oxycodone in a 10 mg tablet could be extracted by crushing and stirring in water (United States v. Purdue Frederick Co., 2007). For the company, and for the audience that the ruling names (treatment providers), this is Level 3. For the three executives, Level 3 is not documented, for the reason given in section A2.1. In 2020 Purdue Pharma also pleaded guilty to conspiracy to defraud the United States and to violate the Food, Drug, and Cosmetic Act, and to two counts of conspiracy to violate the anti-kickback statute; the audience deceived was the Drug Enforcement Administration (U.S. Department of Justice, 2020). The plea contains nothing about deceiving patients or the public. An analysis of internal documents revealed in the Oklahoma litigation shows that manufacturers relied largely on unbranded campaigns that were publicly presented as promoting public health and were described inside the company as "a way to increase sales" of opioids (Yakubi et al., 2022a). This is Level 2. The authors themselves note that the collection is incomplete and that many items are drafts that may never have been used. The US$465 million judgment against Johnson & Johnson and Janssen in the same Oklahoma case was reversed by the state supreme court in November 2021, because the court did not accept the first court's reading of the public nuisance statute (OPB, 2021). The reversal concerns the application of the statute and does not change the validity of the documents.

A2.4 The six sectors on the ladder

Case	Unit	Audience	Highest documented level	Source and caveat
Purdue	Company (executives separately)	Physicians; in 2020 the Drug Enforcement Administration	3	Pleas of 2007 and 2020; Level 3 is not documented for the executives (A2.1)
Opioid manufacturers (Oklahoma documents)	Several companies	Physicians and the public	2	Incomplete documents, some of them drafts
Meta, Facebook documents	Company	Legislators, researchers, users	1	Non-publication is documented and intent to mislead is not; the company says the research did not show "toxicity" (Wells et al., 2021)
Meta, 2026 verdicts	Company	Users, parents	2 to 3	First-instance and appeal proceedings under way; in New Mexico the court's judgment upholds 75,000 violations at US$5,000 each but does not reproduce the jury form, so "knowing" relies on the Associated Press report (New Mexico First Judicial District Court, 2026); in Los Angeles, "malice, oppression or fraud" and a single plaintiff
C8 (DuPont, 3M)	Companies	Regulator, employees, scientific community	1 to 2	39 documents from 1961 to 2006; the authors speak of "manufactured silence" and do not speak of intent (Gaber et al., 2023); the 2005 settlement with the Environmental Protection Agency is not a finding of fault
Glyphosate (Monsanto)	Company	Journals and regulator; jury	2 for documents; verdict: "malice", as quoted from the plaintiff's lawyer	The leaked emails (Krimsky & Gillam, 2018) were read at abstract level only. In July 2020 the California Court of Appeal upheld the verdict and reduced damages to US$20.5 million; according to a news report the reason was causation, not intent (Claims Journal, 2020)
Coca-Cola and the Global Energy Balance Network	Company and academics	Public	2	Concealing the role and the amount; intent to mislead about the science has not been shown (Serodio et al., 2020)

Case	Unit	Audience	Highest documented level	Source and caveat
Lunchables (Kraft, Philip Morris)	Company	—	0 for deception	Transfer of design knowledge is documented and the public statement is not inconsistent (Schmidt, 2026; full text not read)
Alcohol, websites	Industry-affiliated organisations	Public	0	Public statement contrary to the science; not an internal document (Petticrew et al., 2018)
Alcohol, MACH	Officials of a research body (not only companies)	Research foundation	2 to 3	A National Institutes of Health working group wrote that the interactions "apparently deliberately" biased the scientific framework (Begley & Joseph, 2018)
Talc (Johnson & Johnson)	Company	Food and Drug Administration, public	1 to 2	Reuters report (Girion, 2018), through a summary; the company denies it
Exxon (comparison)	Company	Public; investors	2 for the public	The 2019 ruling for investors went the other way
Tobacco (reference)	Companies	Public	3	Kessler ruling (United States v. Philip Morris USA Inc., 2006); full text not read

Patterns, as description and not hypothesis:

1. In the six sectors, Level 3 with a final plea is documented only for Purdue. In the others, either it is a first-instance court ruling with appeal pending (Meta), or the phrase about intent is reported only from the plaintiff's lawyer (glyphosate, where the appeal court upheld the verdict on causation), or the phrase about intent comes from a review group and concerns officials (MACH), or there is a document but no intent in it (C8, talc, Facebook, Coca-Cola).
2. The dominant pattern is Level 1 to 2: the industry knew or concealed, but the source does not say "it wanted to deceive the public".
3. The highest documented level depends on the audience, but we see no consistent pattern across audiences. For the public, the highest documented level in the main sectors is 2 (opioids, Coca-Cola), in Meta it is 2 to 3 with rulings still in progress, and in Exxon (comparison) it is 2; only in tobacco (reference) is it 3. For physicians, 3 occurs only in Purdue (2007); for a regulatory body, 3 occurs only in Purdue (2020) and 2 to 3 in MACH. That is, wherever Level 3 exists, it comes from a single case with a plea and not from a difference of audience. With this number of cases one cannot say that audiences differ systematically.

These patterns belong to the selected cases and do not generalise to other industries.

A2.5 Why the gap does not turn into intent

A document shows "knowing", and five explanations other than intent to deceive are still possible:

1. **Genuine scientific dispute.** On glyphosate, the International Agency for Research on Cancer judged it "probably carcinogenic", and the European Food Safety Authority and the US Environmental Protection Agency did not (IARC, 2015; EFSA, 2015; EPA, 2017). Benbrook shows that the difference comes from the kind of studies each body used: of 52 registrant tests that the EPA cited, one was positive, whereas of 52 published tests of technical glyphosate, 35 were positive (Benbrook, 2019); the author has himself been an expert witness for plaintiffs in glyphosate litigation. On social media, internal research on the subgroup of teenage girls is set against an analysis of three datasets with 355,358 people that found a negative but small association and said that digital technology explains "at most 0.4% of the variation in well-being" (Orben & Przybylski, 2019). So "the company knew" is itself contested here.
2. **An incomplete document or a draft.** For example, the 1991 draft statement in C8 and the Oklahoma documents, whose publication has not been established.
3. **Silence versus a contrary statement.** Not publishing internal research is not the same as stating the opposite. The Facebook documents show the former, and Meta says it did not regard the finding as "toxic" (Wells et al., 2021).
4. **One unit's knowledge versus executives' knowledge.** A document from one employee or laboratory does not prove that senior executives knew (the Purdue ruling, section A2.1).
5. **The company's rebuttal.** Purdue, Meta, Monsanto and Johnson & Johnson each deny part of the claim. A rebuttal is not in itself evidence, but where the source gives it we have reported it.

A2.6 What this section does not say

It does not measure the intent of individuals. It does not measure the intent of a whole industry either, since the units are specific companies. It does not read the absence of Level 3 as the absence of intent, because our evidence comes mostly from places where litigation or disclosure has exposed documents (Saadat, 2026b, section 4.2). And it does not measure the intent of audiences (physician, patient, consumer); that is the subject of the later sections.

A3. Did people believe? Evidence on the effect on the audience

The previous section showed that for intent we have, at best, documents and rulings. This section asks what we have for the audience. The short answer is that in most sectors there is evidence on what the product or marketing did to people, and almost none on what people came to believe because of what the industry said. This section asks why.

A3.1 The chain of effect and what each link needs

The effect of an industry statement on the audience has several links: the audience met the statement (exposure), came to believe something or changed a belief (belief), and changed behaviour (behaviour). Each link needs its own evidence. An internal document saying that the

company wanted physicians not to worry about addiction shows the intended effect (E1); it shows neither that the message arrived, nor belief, nor behaviour. We therefore never count an internal document as an effect. To get from exposure to behaviour, especially to attribute it to the message itself and not to something else, we need at least one of two things: an experiment that isolates the message (E4), or an external change that spreads exposure independently of the audience's characteristics (E3, with the caveat of section A1.5).

A3.2 Six obstacles to identification

1. Drug launch and deception arrive together. The best design on opioids compares states that had triplicate prescription programmes with others. Alpert and colleagues showed that after the launch, the distribution of OxyContin in triplicate states was about 50% lower and overdose deaths rose more slowly there, and they concluded that the launch and marketing explain a large part of the deaths (Alpert et al., 2022). This is E3 (supply and marketing). But the design measures the effect of "supply plus marketing"; it cannot separate the misleading content from the availability of a new drug. So our best evidence on behaviour does not answer the question "did the deception have an effect?"; it answers the question "did supply and marketing have an effect?".

2. Dependence and price separate behaviour from belief. After the reformulation of OxyContin in 2010, heroin deaths rose quickly in states where misuse of the drug had previously been high (Alpert et al., 2018). This is E3 (supply) and shows that behaviour after a supply cut comes from dependence and substitution. Such behaviour says nothing about belief. So a fall or rise in behaviour cannot be read as a sign of changed belief, whether before or after disclosure.

3. Audiences are not alike. In a randomised experiment on climate change (392 people), a misleading message (the Oregon Petition) slightly lowered average belief in the consensus, acceptance and attribution, but the text of the paper does not treat these differences as significant (in the paper's table 4 the main effect on attribution is reported as significant, so the paper is inconsistent with itself). Instead, it polarised the audience: strong supporters of the free market fell on all four measures and weak supporters of the free market tended to rise, and teaching the technique of "fake experts" neutralised the effect (Cook et al., 2017). This is E4 (message), although its message comes from a non-industry website, and it says two things: the average effect is small and statistically unstable while subgroups move in opposite directions, and the effect depends on the audience's prior commitment. Any single estimate of "the effect on the public" is therefore misleading. Note that this experiment is a short online exposure, and one cannot move from it to the accumulated effect of decades of campaigning.

4. The counterfactual of "no statement" is not seen. To know the effect of a statement we must know what would have happened if it had not been made. On social media, the expansion of Facebook across American universities (a difference-in-differences design) worsened students' mental health (Braghieri et al., 2022), and a randomised four-week deactivation before the 2018 midterm elections lowered online activity, raised reported well-being and reduced news knowledge and polarisation (Allcott et al., 2020). This is E3 (product), with a randomised design: the designs are strong, but what they isolate is the product, not the effect of the company's statements about it. We do not know whether parents' beliefs or users' behaviour would have differed if the company had published its internal research. We found no evidence on this question (E0). And the size of the harm is contested: an analysis of three

datasets with 355,358 people found a negative but small association, "at most 0.4% of the variation in well-being" (Orben & Przybylski, 2019).

5. Past belief was not measured. To know that the industry built a belief, we must know belief before and after the campaign. In opioids, the 1980 letter by Porter and Jick was cited 608 times, and 439 citations (72.2%) took it as evidence that addiction is rare, with citations rising after the launch of OxyContin in 1995 (Leung et al., 2017). This is E2 for belief in the written literature. For physicians' own belief there is a national survey of 1010 primary care physicians in 2014: nearly 90% agreed that some people do not realise how easily they become addicted, and 46% agreed that pharmaceutical companies promote painkillers without adequate knowledge of their safety; the authors regard this figure as low given the industry's role in 1990s promotion and say that physicians may be unaware of those events or may locate the cause in the individual (Kennedy-Hendricks et al., 2016). This too is E2: one cross-section, a 29.2% completion rate, two decades after the launch, and not attributed to a specific message. On social media, surveys follow belief in harm: in 2024, 48% of teenagers said that the effect of social media on people their age is mostly negative (32% in 2022) and 14% said so about themselves (9% in 2022), and 55% of parents are very concerned about teenagers' mental health (Pew Research Center, 2025; 1391 teenagers and parents). This is E2 and, although it has two time points, it is not about the company's statements. In chemicals, an online survey (1100 people) showed that 45% had never heard of PFAS and 32% had heard of it but did not know what it is (77% in total), and more than 97% did not believe their drinking water contained it (Berthold et al., 2023). This shows ignorance, but it is one cross-section and is not attributed to any industry action. The only sector with multi-year tracking is climate, with a survey running since 2008 (in 2024, with 1013 people: 73% believed warming is happening, 60% thought it mostly human-caused and 21% said there is a great deal of disagreement among scientists; Leiserowitz et al., 2025). Even that shows belief and not its cause.

6. Exposure is unseen and disclosure is selective. An internal document says a campaign was planned; it does not say whom it reached. Marketing payments for opioids to physicians have been counted only for 2013 to 2015: 7.0% of 369,139 opioid prescribers in public drug insurance received a payment in 2014 (Hadland et al., 2018), and nearly US$40 million of marketing reached more than 67,500 physicians from August 2013 to December 2015 (Hadland et al., 2019). This is E2 and says nothing about the 1990s and the launch of OxyContin. In addition, our sources come from places where litigation or disclosure has exposed documents. The Oklahoma document collection is incomplete and part of it is drafts (Yakubi et al., 2022a, 2022b). So the sectors with the most documents are the sectors that have been litigated most; few documents does not mean no action.

A3.3 What exists in each sector

Sector	Exposure	Belief	Behaviour	Caveat
Opioids	E2 (2013 to 2015, all companies)	E2 (written literature; 2014 physician survey)	E3 (supply and marketing together)	Content cannot be separated from supply; belief is not attributed to a specific message
Social media	Undisputed (use)	E2 (belief in harm, 2022 and 2024; not about the company's statements)	E3 (product; one randomised design)	The effect of statements was not measured; the size of the harm is contested
Chemicals	E0	E2 (awareness of PFAS, one cross-section)	E0	Not attributed to any industry action
Food and drink	E0	E4 (sugar-sweetened beverages; Maani et al., 2022)	E0	One experiment with genuine industry excerpts; the outcome is certainty about risk, not behaviour*
Alcohol	E0	E4 (breast cancer and pregnancy; Maani et al., 2022; one study with two experiments) and E2 (awareness of carcinogenicity)	E0	Same caveats; warning-label experiments are not industry messages and were not counted
Talc	E0	E0	E0	A targeted search found no public-awareness survey on talc; a more thorough search is needed
Climate (Exxon)	E0	E4 (message; Maani et al., 2022; Amazeen et al., 2025) and E2 (tracker since 2008)	E0	Two experiments with an industry message; both short; belief was measured, cause was not
Tobacco (reference)	Not graded	E4 (four randomised experiments with industry messages or marketing; Maani et al., 2022; Yang et al., 2022; Moran et al., 2025; Gratale et al., 2019) and E2 (1999 survey on "light" cigarettes)	Not graded	The count comes from the post hoc screen of abstracts and is a lower bound (section A3.4)

* A review of reviews showed that reviews of sugar-sweetened beverages whose authors had conflicts of interest with the food industry were about five times more likely to conclude that there is no positive association with weight gain (Bes-Rastrollo et al., 2013; read at abstract level). This is a relation between funding source and conclusion within the research literature, not a measure of what an audience came to believe as a result of an industry message; so it does not receive E2 in the "belief" column and is evidence of another kind (bias in the production of the literature). Opioids differ: Leung et al. (2017) measure how readers used one specific letter.

On the tobacco row. We filled the belief column in two ways. First, a random-digit telephone survey of 2120 daily smokers in the United States in September 1999 that measured their beliefs about "light" and "ultra light" cigarettes (Shiffman et al., 2001; the article page was read, not the PDF). On average, smokers believed that "light" cigarettes reduce health risk by about 25% and "ultra light" by about 33%. This is E2: one cross-section, not attributed to an industry message; the authors link this belief mainly to the experience of smoke mildness and, less so, to belief about tar, and on the page we read they do not attribute it to industry marketing. The thematic fit with the court's corrective statements is evident, since one of the five topics of the statements is the absence of any health benefit from "light" and "low-tar" cigarettes (U.S. Department of Justice, 2022). In addition to this survey, the post hoc screen (section A1.4) found four randomised experiments with the industry's own message or marketing that measure belief, risk perception or attitude: Maani and colleagues (2022; genuine industry excerpts on alternative causes of lung cancer), Yang and colleagues (2022; a risk-reduction claim for IQOS), Moran and colleagues (2025; a "greenwashed" cigarette advertisement) and Gratale and colleagues (2019; misleading marketing of "natural" cigarettes, with support for regulation as the outcome). If marketing elements such as packaging and descriptive wording are also counted, the count is 12. We read these at abstract level. The count is a lower bound, because the screen found only two of the six known tobacco studies. The literature on belief in tobacco is far larger than this, and we have not reviewed it.

A3.4 The hypothesis against this evidence

In section A0 we stated the hypothesis with three claims. This section tests the first claim against table A3.3 and against a rule that we wrote before seeing the data. The claim was: apart from climate, in no sector where company conduct is documented at Level 2 or above are there more than two E4 (message) studies. This claim was rejected. We had seen tobacco before recording any rule, and the first claim in its original form was rejected with it. On the strictest reading, tobacco has four studies with industry messages or marketing (twelve with marketing elements), and Maani and colleagues (2022) also have experiments for alcohol and sugar-sweetened beverages. Climate, which was thought to be the exception, has only two studies (Maani et al., 2022; Amazeen et al., 2025), that is, fewer than tobacco. We also tested another form of the claim: experiments on industry messages exist where the message is public and repeatable (tobacco, climate) and do not exist where the message was private or one-to-one (opioids, talc). We recorded the rule only for this rewritten formulation, and before seeing the candidates from the non-tobacco sectors (section A1.4): if climate or tobacco had fewer than three experiments, or opioids or talc more than two, the claim would be falsified. Climate had two experiments, so the rule announced falsification. Opioids and talc gave zero, which matches the prediction, but there are two caveats: our screen found between a third (tobacco: 2 of 6) and a half (53%, section A1.3) of the known studies, and the absence of experiments is

not the absence of an effect. So the climate count also rests on the same imperfect screen, and this falsification is not conclusive. The falsification of the first form (climate is the exception), however, comes from tobacco and is not sensitive to the screen's recall. Conclusion: we set the first claim aside, and two claims remain (section A5.1). We regard "availability of the message" only as a post hoc, untested explanation and place it on the research agenda (section A5.4). Where experiments exist, the outcome is belief and risk perception, and behaviour is not measured. In the other sectors there is either no evidence on belief or it is not tied to an industry action: alcohol and PFAS measure belief, and so does physicians' belief in opioids (all E2).

A3.5 What this section does not say

It does not say that the industry had no effect on the public. It does not say that people were not deceived. It says that in our search, evidence of the effect of statements on belief exists only in short experiments in a few sectors, and evidence of an effect on behaviour is almost absent; and the six obstacles explain this absence, some of them arising from research design and some from what documents and litigation reveal. "We did not find evidence" is not the same as "there is no effect". E0 in the tables means "in our search", and the search itself captures only part of the sources for these questions (section A1.4). One round of targeted manual searching showed that this warning is not baseless: two rows that were E0 (physicians' belief in opioids and belief in harm in social media) were filled with surveys that the automated search had not brought up. Both became E2, and neither is attributed to an industry message; this shows that the E0 count partly reflects search effort: rows that were searched manually were filled and the others were not. The post hoc screen repeated this: the food and alcohol rows, which were E0, were filled with experiments that the automated search had not brought up (section A3.4).

A4. After disclosure: what the industry did and what people did

The third question is: when a practice was disclosed, what visible consequence followed? The answer has two sides. The industry side (what the company did) is seen in events that can be counted: a plea, a ruling, a settlement, market exit. The audience side (what people did) is seen less. This section keeps the two apart.

A4.1 A disclosure event and a policy event

The first condition is to separate a disclosure event from a policy event. Purdue's plea in 2007, the social media court verdicts in 2026 and the leak of the Facebook documents in 2021 are disclosure events. The Centers for Disease Control and Prevention guideline on opioid prescribing in 2016 is a policy event. Only the first kind answers the question "what effect did disclosure have?". This separation is built into the D scale (section A1.5): D0 is an event only, D1 a descriptive outcome without comparison, D2 an outcome with comparison but mixed with policy events, and D3 the effect of disclosure isolated with an appropriate design.

A4.2 The industry side: events exist, effects are few

Opioids. In February 2018 Purdue stopped promoting opioids to physicians and cut more than half of its sales force, in response to plaintiffs' demands in the lawsuits (Jay & Perrone, 2018). This is D0: it is an event, not an effect. There is somewhat more evidence on competitors' behaviour: after the settlement of Kentucky's suit against Purdue in December 2015, spending on food and drink in sales visits to promote OxyContin fell from US$1.5 million in 2014 and

2015 to US$54 thousand in the following two years, and competitors' spending to promote rival opioids rose from US$911 thousand to US$2.4 million (an increase of 160%), to the same physicians and to OxyContin prescribers, even in counties with severe epidemics. The authors say that this increase is not explained by targeting physicians who prescribe more expensive drugs, branded drugs or more opioids (Tan & West, 2023; the journal abstract and two university and journal reports were read, not the full text). This is D2: two groups of companies are compared before and after the settlement, and physician characteristics and epidemic severity are controlled, but it is not separated from simultaneous events. The measure is only food and drink spending in visits, not total promotion, and not prescriptions or market share. So what it shows is this: one company's settlement did not reduce competitors' promotion and, on this measure, increased it. Whether competitors took Purdue's prescriptions has not been measured.

Chemicals. In July 2021 Bayer announced that it would end sales of Roundup for lawn and garden use in the United States by January 2023 and replace glyphosate with another substance. The Environmental Working Group (EWG) writes that Bayer had inherited about 125,000 claims and had settled all but about 30,000 of them, and describes the move as an attempt to protect the company from litigation (EWG, 2021). EWG is an advocacy source, and Bayer's reason is not quoted in it. This is D0.

Talc. Johnson & Johnson stopped selling talc-based baby powder in the United States and Canada. According to Reuters (2018), the product made US$420 million of the company's US$76.5 billion revenue. Exit is cheap for a company when the product's share is small. D0.

Note. The company itself carries out all three events, and all three may relate to litigation or financial considerations. We do not read "exit" as a sign of acceptance.

A4.3 The audience side: what exists

Opioids. Gallup (September 2019, 1525 people): 27% of the public had a positive view and 58% a negative view of the pharmaceutical industry, a net negative of 31, ranked last of 25 industries and the lowest since 2001; Gallup does not attribute this to opioids alone (McCarthy, 2019). AP-NORC survey (April 2019, 1108 people): 70% of those with personal experience of addiction and 59% of others considered pharmaceutical companies "very responsible" (AP-NORC, 2019). This is D1: a single time point, without comparison, and it measures "blame", not "trust". There is also the prescribing trend: according to the Centers for Disease Control and Prevention, the prescribing rate peaked in 2010 to 2012 and has fallen since 2012. After the Centers' 2016 guideline, days' supply were 4.7% lower than projected in the first year and 9.8% lower in the second (Goldstick et al., 2021). This is D2 and is a policy event, not an industry disclosure; state laws and prescription monitoring were simultaneous.

Social media. After the Cambridge Analytica scandal in March 2018, according to Pew (Perrin, 2018; 3413 Facebook users, margin of error 2.8 points, as cited in a news report), 54% of Facebook users had changed their privacy settings, 42% had stopped using the platform for several weeks or more and 26% had deleted the app. A study of 380 Facebook users (Schlackl et al., 2025; abstract and publisher's page read, not the full text) compared users whom Facebook's official notification identified as actual victims of the data breach with users who only might have been affected. Victims initially reacted more strongly in intention to continue use, trust and sense of violation, but the effects were small and heterogeneous. At the six-month

follow-up (183 people) these differences had disappeared. A pre-registered scenario experiment (653 people) shows that when leaving is costly, cognitive dissonance keeps victims' attitudes more favourable. This is D2 and not D3, for two reasons. First, both groups were exposed to news of the scandal; the design isolates the effect of "being a victim" and not the effect of disclosure itself. Second, the event is a data breach and not the disclosure of deceptive conduct about harm; so this case lies outside the main concept of the paper and only shows what can be seen with a comparison group. Half the sample was lost by the follow-up. After the publication of the Facebook documents in September 2021, Facebook's daily users reached 1.929 billion in the fourth quarter of 2021, from 1.93 billion in the third quarter, the first quarterly decline in the company's history; company executives named competition for people's time (including TikTok) and pressure on advertising sales as the cause of slower growth (Hayes, 2022; a news report with the Associated Press, not a company statement). D0 to D1, with a single quarter and no comparison group. And the Pew series shows that belief in the harm of social media among teenagers rose from 2022 to 2024 (from 32% to 48% for people their age); this increase occurred after the 2021 disclosures, but has not been attributed to them, and other reasons (for example, public debate about mental health) cannot be excluded.

Chemicals. After the verdicts or the International Agency for Research on Cancer's classification in 2015, we found no study on glyphosate consumers' behaviour (D0). PFAS, apart from the 2023 awareness survey mentioned earlier, has nothing in the after-disclosure section.

Climate. Survey experiments in the United States, India and South Africa found "surprisingly little evidence" that information about fossil-fuel divestment raises support for climate policy (Schwartz et al., 2024). This is an experimental design, but it concerns information about divestment, not disclosure of industry conduct. We found nothing on the effect of Exxon's disclosures (the 2015 reports and the lawsuits) on public opinion (D0).

A4.4 Tobacco: a natural experiment whose outcome was not measured

The 2006 Kessler ruling required corrective statements on five topics (addiction, health effects, secondhand smoke, nicotine manipulation, and "light" and "low-tar" cigarettes), and their text was set through subsequent court orders. The final order of December 2022 took effect on 1 July 2023, and the companies had three months to get retailers to display them (U.S. Department of Justice, 2022; the list of five topics and the dates were taken from the Department of Justice notice; we have not read the text of the 2006 ruling). This is the most natural experiment for the effect of formal disclosure on belief: a mandated exposure with a fixed date. In our search no outcome study for the disclosure event appeared. There are experiments that test the corrective messages themselves or similar messages: Smith and colleagues (2011), in a randomised experiment with 239 smokers, tested five versions of a corrective statement; knowledge and misperceptions improved but returned to baseline within a week. Villanti and colleagues (2025), in a randomised experiment with 794 people, tested corrective messages about nicotine; misperceptions fell and there was almost no effect on intention and use (these messages are public health messages, not the text of the court ruling). These are tests of the message, not tests of the disclosure event, so they are not D3. The advertising experiment of Tangari and colleagues (2010), which was precisely about these statements, is recorded as "withdrawn" on the publisher's page and we do not use it. There is a registered clinical trial to test the statements (identifier NCT01282008), of which we have

seen only the registration and not the result. So evidence on the outcome of the tobacco corrective statements either does not exist or we did not find it.

A4.5 Why "behaviour did not change" does not mean "they did not care"

In sections A4.2 and A4.3 we saw that after disclosure most series are either D1 or D0. When behaviour (for example, use of Facebook) did not change, five explanations other than indifference are possible:

1. **Dependence and switching cost.** A user or patient cannot easily leave (section A3.2, obstacle 2). After 2010 we saw that behaviour follows supply.
2. **Whether the news arrived.** We do not know whom the news reached.
3. **Simultaneous policies.** In opioids, the guideline, laws and prescription monitoring arrived together (Goldstick et al., 2021).
4. **Data held by the company.** The best behavioural series for Facebook is the company's own daily users.
5. **The size of belief and behaviour.** In Schlackl and colleagues' study, attitudes first fell and then returned, and the cost of leaving can keep attitudes favourable; attitude and staying on the platform move separately.

A4.6 What this section does not say

It does not say that disclosure has no effect. It says that in our search we found no event study of the disclosure of industry conduct (other than the industry's own conduct), and that the outcomes are either single time points or mixed. And it does not say that a company's exit or settlement is an admission.

A5. Discussion

A5.1 The two-sides-of-a-coin hypothesis, with this paper's evidence

We have called the hypothesis a hypothesis from the beginning, and with the evidence of sections A2 to A4 we can now state it more precisely. It had three claims. The first claim was rejected (section A3.4). The other two remain; our evidence is consistent with them and does not test them.

Claim 1, asymmetry (rejected). Apart from climate, in no sector where company conduct is documented at Level 2 or above are there more than two E4 (message) studies. Tobacco has four studies (twelve with marketing elements), alcohol and sugar-sweetened beverages at least one each (Maani et al., 2022), and climate only two. So the claim as written is false. What remains is description: experiments on industry messages exist in a few sectors, and their outcome is belief and risk perception, not behaviour. "It is hard to know" has two meanings: it is hard because there is no suitable design, or because we have not yet measured. The present evidence does not distinguish between the two. All we know is that designs have been built in tobacco, climate and a few other sectors, so the inherent nature of the shortage in the rest has not been shown.

Claim 2, heterogeneity. The effect of an industry message on the audience is not uniform and depends on prior commitment. We have two experiments (Cook et al., 2017; Maani et al., 2022;

section A3.2). Cook's message is not an industry message (a non-industry doubt-making argument); for "industry message" only Maani remains, so the evidence is thin. The first shows a stable mean and subgroups moving in opposite directions; the second finds the effect stronger in the less knowledgeable and weaker in the more knowledgeable. Both are short online exposures.

Claim 3, after disclosure. A consequence of formal disclosure for the company (plea, ruling, settlement or market exit) is visible. A consequence for the audience, in a design that isolates the effect of disclosure itself (D3), does not exist in our sectors. The corrective-message experiments in tobacco (Smith et al., 2011; Villanti et al., 2025) test the message, not the disclosure event. Note: disclosure and settlement reach the company and do not necessarily reach promotion in the market; Tan and West (2023) show that after the Kentucky settlement, competitors' promotion spending on Purdue's same physicians rose (one study, only food and drink spending in visits; full text not read).

Three falsifiers; the first has been realised.

1. Realised: tobacco has four E4 (message) studies, alcohol and sugar-sweetened beverages one, and climate only two (section A3.4).
2. More experiments showing a uniform effect of an industry message on audiences with different prior commitments. Our two experiments show the opposite.
3. D3-type event research on formal disclosure that shows an audience outcome as readily as a company outcome. The tobacco corrective statements are the most natural test (section A4.4). If outcome research on them is found and shows a clear effect, Claim 3 is weakened.

What we have gathered does not test the two remaining claims; it is consistent with them. And our consistency rests on our own search: if the search is incomplete, "there is no evidence" may mean "we did not find the evidence" (sections A1.4 and A3.5).

A5.2 Answers by audience

One industry action has a separate answer for each audience. From this paper's evidence:

Audience	What exists	Lesson
Regulator	Purdue pleaded guilty in 2020 to deceiving the Drug Enforcement Administration (U.S. Department of Justice, 2020)	Intent to deceive the regulator is documented by a plea, but it says nothing about patients
Physician	2007 ruling on misleading labelling; 2014 physician survey (Kennedy-Hendricks et al., 2016)	Intent towards physicians is documented; physicians' belief has been measured but not attributed to a message
Investor	In 2019 a New York court did not find that Exxon had misled investors (CNBC, 2019)	The legal answer changes with the audience and the standard
Public	Analysis of 187 Exxon documents; belief experiments (Supran & Oreskes, 2017; Cook et al., 2017)	Here the gap between knowing and saying exists, and an effect on belief does not, or is heterogeneous

This table is not an interpretation; it is a summary. If we apply evidence about one audience to another (for example, a plea about the regulator applied to the public), we have made an error.

A5.3 Borderline cases

Vaccines. The tables do not include vaccines, and we give them only a paragraph, because their structure differs from that of an industry. The 1998 Lancet paper linking the triple vaccine to autism was retracted on 2 February 2010, after the UK General Medical Council's ruling of 28 January 2010; the council found the lead author guilty of dishonesty and of breaching ethical protocol, and said he had subjected children to invasive procedures without clinical need, and The Lancet said that several claims in the paper, including "consecutive referral" and "ethics committee approval", were false (Dyer, 2010). This is a disclosure and retraction event, and the author is a researcher, not an industry. So the intent ladder may be applicable here too, but not in the form used for industry; we have not tested this. We have not obtained a verified source on its effect on public belief and behaviour, and we make no claim. For vaccines to enter the tables, a separate search is needed: vaccines have a non-industry actor and belief and behaviour may move separately.

Positive thinking. As stated in the previous paper, it stays outside the tables (Saadat, 2026b).

A5.4 Research agenda

1. **A complete count of experiments on industry messages.** Our screen was post hoc and found between a third and a half (section A1.4). A systematic review with a second coder, across all sectors, would confirm or correct the count in section A3.4.
2. **A belief tracker for every sector.** Climate has one (Leiserowitz et al., 2025) and the others do not. A simple annual tracker with questions about belief in specific industry claims would close the gap.
3. **Event studies around disclosure.** For 2007 and 2019 to 2020 (opioids), 2021 (social media) and 2006 (tobacco) we found no such research. Stock-market data and earlier surveys make it possible.
4. **Tobacco corrective statements.** This is a mandated exposure with a fixed date. An outcome evaluation with a comparison group would test falsifier 3.
5. **Separating content from supply.** Designs that separate "misleading advertising" from "availability" (for example, a legal change in a label with supply unchanged) would open obstacle 1 of section A3.2.
6. **Experiments on prior commitment.** Adding more experiments with different audiences to the climate literature, and extending them to another sector.
7. **Access to company data.** The best behavioural series for social media is held by the company (section A4.5). Requiring its release for research is a policy instrument, and we do not propose it; we only note it.
8. **Testing the "availability of the message".** This is a post hoc proposal: experiments on industry messages exist where the message is public and repeatable. Testing it needs

a pre-registered design that divides sectors, before counting and by an independent rule, into public and private messages.

A5.5 Limitations

- **One coder.** One person did the grading, and there has been no retest with a second coder. The rules are explicit so that someone else can check (section A1.5).
- **Search.** Only one database and in English; we wrote the seed sources from memory and the hold-out group is not clean; and the keyword screen kept only 3 of 13 seeds in the top band. Of known sources outside the seeds, 8 of 15 were recovered (53%, section A1.3). We do not claim precision or recall for the whole literature (sections A1.3 and A1.4). For several E0 rows we also did a targeted manual search, which filled two rows; this shows that E0 in the tables means "in our search". The post hoc screen (section A1.4) filled two further rows, food and alcohol.
- **Search ceiling.** 14% of the queries (24 of 175) still hit the ceiling of 1000 works, and only the most-cited were kept; E0 in recent areas (especially social media, 2025 to 2026) must be read with this caveat.
- **Tobacco.** The count of tobacco experiments comes from a post hoc screen at abstract level and is a lower bound, because the screen found only two of the six known studies. The literature on belief in tobacco is far larger and has not been reviewed.
- **Depth of reading.** We read many sources at page or abstract level, not in full text. Items not read appear with the label "not read" in the tables of the relevant sections or in the text, and are listed here: the text of the 2006 Kessler ruling; the form of the New Mexico jury verdict (the court's final judgment upholds 75,000 violations but does not reproduce the form; "knowing" comes from a news report); the full text of Schmidt (2026); the full text of Schlackl et al. (2025) (abstract and publisher's page only); and Tan and West (2023) (from the journal notice). Maani and colleagues (2022) and Cook and colleagues (2017) were read at article-page level; full text was read only for Amazeen and colleagues (2025).
- **Secondary sources.** We have taken court rulings sometimes from news and sometimes from legal summaries. Several rulings (Meta, glyphosate) are at first instance or under appeal and may change.
- **Case selection.** The six sectors are not a random sample of industries. The patterns in section A2.4 belong to these cases.
- **Legal standard versus scientific standard.** Every ruling answers a legal question (section A2.1), which is not the same as the scientific question.
- **The E and D scales were built for this paper and have not been tested elsewhere.**
- **Date.** Sources were consulted up to 2 November 2026. Forthcoming events (appeals, new research) may change the picture.

References

Allcott, H., Braghieri, L., Eichmeyer, S., & Gentzkow, M. (2020). The welfare effects of social media. *American Economic Review, 110*(3), 629–676. https://doi.org/10.1257/aer.20190658

Alpert, A. E., Evans, W. N., Lieber, E. M. J., & Powell, D. (2022). Origins of the opioid crisis and its enduring impacts. *The Quarterly Journal of Economics, 137*(2), 1139–1179. https://doi.org/10.1093/qje/qjab043

Alpert, A., Powell, D., & Pacula, R. L. (2018). Supply-side drug policy in the presence of substitutes: Evidence from the introduction of abuse-deterrent opioids. *American Economic Journal: Economic Policy, 10*(4), 1–35. https://doi.org/10.1257/pol.20170082

Amazeen, M. A., Sovacool, B. K., Krishna, A., Debnath, R., & Wells, C. (2025). The "Future of Energy"? Building resilience to ExxonMobil's disinformation through disclosures and inoculation. *npj Climate Action, 4*, Article 19. https://doi.org/10.1038/s44168-025-00209-6

AP-NORC Center for Public Affairs Research. (2019, April 25). *Pharmaceutical companies and drug users most often blamed for opioid crisis*. https://apnorc.org/projects/pharmaceutical-companies-and-drug-users-most-often-blamed-for-opioid-crisis/

Begley, S., & Joseph, A. (2018, June 15). Controversial NIH study of "moderate drinking" will be terminated after scathing report. *STAT*. https://statnews.com/2018/06/15/nih-report-controversial-alcohol-study/

Benbrook, C. M. (2019). How did the US EPA and IARC reach diametrically opposed conclusions on the genotoxicity of glyphosate-based herbicides? *Environmental Sciences Europe, 31*, Article 2. https://doi.org/10.1186/s12302-018-0184-7

Berthold, A., McCrary, A., deVilleneuve, S., & Schramm, M. (2023). Let's talk about PFAS: Inconsistent public awareness about PFAS and its sources in the United States. *PLOS ONE*. https://doi.org/10.1371/journal.pone.0294134

Bes-Rastrollo, M., Schulze, M. B., Ruiz-Canela, M., & Martinez-Gonzalez, M. A. (2013). Financial conflicts of interest and reporting bias regarding the association between sugar-sweetened beverages and weight gain: A systematic review of systematic reviews. *PLoS Medicine, 10*(12), e1001578. https://doi.org/10.1371/journal.pmed.1001578

Braghieri, L., Levy, R., & Makarin, A. (2022). Social media and mental health. *American Economic Review, 112*(11), 3660–3693. https://doi.org/10.1257/aer.20211218

Brownlee, J. L. (2007, July 31). *Testimony before the Senate Committee on the Judiciary: Ensuring that death and serious injury are more than a business cost: OxyContin and defective products*. U.S. Senate. https://www.judiciary.senate.gov/imo/media/doc/Brownlee%20Testimony%20073107.pdf

Claims Journal. (2020, July 21). Bayer loses California appeal of Roundup verdict, but damages are reduced. https://www.claimsjournal.com/news/national/2020/07/21/298305.htm

CNBC. (2019, December 10). Exxon did not mislead investors, a New York judge ruled on Tuesday. https://www.cnbc.com/2019/12/10/exxon-did-not-mislead-investors-a-new-york-judge-ruled-on-tuesday.html

Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. *PLOS ONE, 12*(5), Article e0175799. https://doi.org/10.1371/journal.pone.0175799

Dyer, C. (2010). Lancet retracts Wakefield's MMR paper. *BMJ, 340*, Article c696. https://doi.org/10.1136/bmj.c696

EFSA. (2015, November 12). *Glyphosate: EFSA updates toxicological profile* [News release]. https://www.efsa.europa.eu/en/press/news/151112

EPA. (2017, December 18). *EPA releases draft risk assessments for glyphosate*. U.S. Environmental Protection Agency. https://epa.gov/pesticides/epa-releases-draft-risk-assessments-glyphosate

EWG. (2021, July 29). *Bayer to end residential sales of cancer-causing weedkiller glyphosate by 2023* [News release]. https://www.ewg.org/news-insights/news-release/2021/07/bayer-end-residential-sales-cancer-causing-weedkiller-glyphosate

Farrell, J. (2016). Corporate funding and ideological polarization about climate change. *Proceedings of the National Academy of Sciences, 113*(1), 92–97. https://doi.org/10.1073/pnas.1509433112

Gaber, N., Bero, L., & Woodruff, T. J. (2023). The devil they knew: Chemical documents analysis of industry influence on PFAS science. *Annals of Global Health, 89*(1), Article 37. https://doi.org/10.5334/aogh.4013

Girion, L. (2018, December 14). Johnson & Johnson knew for decades that asbestos lurked in its Baby Powder. *Reuters*. https://www.nbcnews.com/health/health-news/johnson-johnson-knew-decades-asbestos-lurked-its-baby-powder-n948016

Goldberg, R. F., & Vandenberg, L. N. (2021). The science of spin: Targeted strategies to manufacture doubt with detrimental effects on environmental and public health. *Environmental Health, 20*, Article 33. https://doi.org/10.1186/s12940-021-00723-0

Goldstick, J. E., Guy, G. P., Losby, J. L., Baldwin, G., Myers, M., & Bohnert, A. S. B. (2021). Changes in initial opioid prescribing practices after the 2016 release of the CDC guideline for prescribing opioids for chronic pain. *JAMA Network Open, 4*(7), Article e2116860. https://doi.org/10.1001/jamanetworkopen.2021.16860

Gratale, S. K., Sangalang, A., Maloney, E. K., & Cappella, J. N. (2019). Attitudinal spillover from misleading natural cigarette marketing: An experiment examining current and former smokers' support for tobacco industry regulation. *International Journal of Environmental Research and Public Health, 16*(19), Article 3554. https://doi.org/10.3390/ijerph16193554

Hadland, S. E., Cerdá, M., Li, Y., Krieger, M. S., & Marshall, B. D. L. (2018). Association of pharmaceutical industry marketing of opioid products to physicians with subsequent opioid prescribing. *JAMA Internal Medicine, 178*(6), 861–863. https://doi.org/10.1001/jamainternmed.2018.1999

Hadland, S. E., Rivera-Aguirre, A., Marshall, B. D. L., & Cerdá, M. (2019). Association of pharmaceutical industry marketing of opioid products with mortality from opioid-related overdoses. *JAMA Network Open, 2*(1), Article e186007. https://doi.org/10.1001/jamanetworkopen.2018.6007

Hayes, K. (2022, February 3). Facebook's daily active users fall for 1st time in its history [News article, with Associated Press]. FOX 9. https://www.fox9.com/news/facebooks-daily-active-users-fall-for-1st-time-in-its-history

IARC. (2015). *IARC Monographs Volume 112: Evaluation of five organophosphate insecticides and herbicides*. International Agency for Research on Cancer. https://www.iarc.who.int/wp-content/uploads/2018/07/MonographVolume112.pdf

Jay, M., & Perrone, M. (2018, February 10). OxyContin maker will stop promoting opioids to doctors. *Associated Press*. https://abcnews4.com/news/nation-world/oxycontin-maker-will-stop-promoting-opioids-to-doctors-02-10-2018

Kennedy-Hendricks, A., Busch, S. H., McGinty, E. E., Bachhuber, M. A., Niederdeppe, J., Gollust, S. E., Webster, D. W., Fiellin, D. A., & Barry, C. L. (2016). Primary care physicians' perspectives on the prescription opioid epidemic. *Drug and Alcohol Dependence, 165*, 61–70.

Krimsky, S., & Gillam, C. (2018). Roundup litigation discovery documents: Implications for public health and journal ethics. *Journal of Public Health Policy, 39*(3), 318–326. https://doi.org/10.1057/s41271-018-0134-z

Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Goddard, E., Carman, J., Myers, T., Verner, M., Marlon, J., Goldberg, M., Ettinger, J., Fine, J., & Thier, K. (2025). *Climate change in the American mind: Beliefs & attitudes, Fall 2024*. Yale Program on Climate Change Communication and George Mason University Center for Climate Change Communication. https://climatecommunication.gmu.edu/all/climate-change-in-the-american-mind-beliefs-and-attitudes-fall-2024/

Leung, P. T. M., Macdonald, E. M., Stanbrook, M. B., Dhalla, I. A., & Juurlink, D. N. (2017). A 1980 letter on the risk of opioid addiction. *The New England Journal of Medicine, 376*(22), 2194–2195. https://doi.org/10.1056/NEJMc1700150

Maani, N., van Schalkwyk, M. C. I., Filippidis, F. T., Knai, C., & Petticrew, M. (2022). Manufacturing doubt: Assessing the effects of independent vs industry-sponsored messaging about the harms of fossil fuels, smoking, alcohol, and sugar sweetened beverages. *SSM - Population Health, 17*, Article 101009. https://doi.org/10.1016/j.ssmph.2021.101009

McCarthy, J. (2019, September 3). Big Pharma sinks to the bottom of U.S. industry rankings. *Gallup*. https://news.gallup.com/poll/266060/big-pharma-sinks-bottomindustry-rankings.aspx

Michaels, D. (2008). *Doubt is their product: How industry's assault on science threatens your health*. Oxford University Press.

Moran, M. B., Ibrahim, M., Czaplicki, L., Pearson, J., Thrul, J., Lindblom, E., Robinson-Mosley, S., Kennedy, R. D., Balaban, A., & Johnson, M. (2025). Greenwashed cigarette ad text and imagery produce inaccurate harm, addictiveness, and nicotine content perceptions: Results from a randomized online experiment. *Nicotine & Tobacco Research, 27*(2), 271–281. https://doi.org/10.1093/ntr/ntae200

New Mexico First Judicial District Court. (2026). *Final findings of fact, conclusions of law and judgment of the court* (No. D-101-CV-2023-02838). https://nmcourts.gov/wp-content/uploads/2026/08/D-101-CV-2023-02838-Final-FOFCOL-and-Judgment-of-the-Court.pdf

OPB. (2021, November 9). Oklahoma court overturns $465M opioid ruling against J&J. https://www.opb.org/article/2021/11/09/oklahoma-court-overturns-465m-opioid-ruling-against-j-j

Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour, 3*(2), 173–182. https://doi.org/10.1038/s41562-018-0506-1

Oreskes, N., & Conway, E. M. (2010). *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. Bloomsbury Press.

Perrin, A. (2018, September 5). *Americans are changing their relationship with Facebook*. Pew Research Center. https://www.pewresearch.org/internet/2018/09/05/americans-are-changing-their-relationship-with-facebook/

Petticrew, M., Maani Hessari, N., Knai, C., & Weiderpass, E. (2018). How alcohol industry organisations mislead the public about alcohol and cancer. *Drug and Alcohol Review, 37*(3), 293–303. https://doi.org/10.1111/dar.12596

Pew Research Center. (2025, April 22). *Teens, social media and mental health*. https://www.pewresearch.org/internet/2025/04/22/teens-social-media-and-mental-health/

Proctor, R. N. (2008). Agnotology: A missing term to describe the cultural production of ignorance (and its study). In R. N. Proctor & L. Schiebinger (Eds.), *Agnotology: The making and unmaking of ignorance* (pp. 1–33). Stanford University Press.

Proctor, R. N. (2011). *Golden holocaust: Origins of the cigarette catastrophe and the case for abolition*. University of California Press.

Saadat, R. (2026a). The place of agnotology in the field of ignorance studies and industrial doubt-making: A bibliometric study. Zenodo. https://doi.org/10.5281/zenodo.23587485

Saadat, R. (2026b). Industrial ignorance-making after tobacco: A case review of six selected sectors based on the 28-strategy list. Zenodo. https://doi.org/10.5281/zenodo.23771023

Saadat, R. (2026c). Search protocol, raw API responses and results for an evidence map of industrial ignorance-making: OpenAlex official run of 1 November 2026 [Data set]. Zenodo. https://doi.org/10.5281/zenodo.23878600

Saadat, R. (2026d). Search protocol, raw API responses and results for an evidence map of industrial ignorance-making: OpenAlex official run of 1 November 2026 (Version 2: post hoc screens and coding of experiments testing industry messages) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.23882692

Schlackl, F., Pethig, F., Höhle, H., & Sabherwal, R. (2025). Reactions by actual data breach victims over time: Evidence from Facebook's Cambridge Analytica breach. *Information Systems Research*. Advance online publication. https://doi.org/10.1287/isre.2023.0391

Schmidt, L. A. (2026). Tobacco industry contributions to the development of ultraprocessed food in the United States, 1985–2007: A case study of Lunchables. *American Journal of Public Health, 116*(7), 940–949. https://doi.org/10.2105/AJPH.2026.308491

Schwartz, J. A., Lendway, P., & Nuri, A. (2024). Fossil fuel divestment and public climate change policy preferences: An experimental test in three countries. *Environmental Politics, 33*(1), 1–24. https://doi.org/10.1080/09644016.2023.2178351

Serodio, P., Ruskin, G., McKee, M., & Stuckler, D. (2020). Evaluating Coca-Cola's attempts to influence public health "in their own words": Analysis of Coca-Cola emails with public health academics leading the Global Energy Balance Network. *Public Health Nutrition, 23*(14), 2647–2653. https://doi.org/10.1017/S1368980020002098

Shiffman, S., Pillitteri, J. L., Burton, S. L., Rohay, J. M., & Gitchell, J. G. (2001). Smokers' beliefs about "Light" and "Ultra Light" cigarettes. *Tobacco Control, 10*(Suppl 1), i17–i23. https://doi.org/10.1136/tc.10.suppl_1.i17

Smith, P., Bansal-Travers, M., O'Connor, R., Brown, A., Banthin, C., Guardino-Colket, S., & Cummings, K. M. (2011). Correcting over 50 years of tobacco industry misinformation. *American Journal of Preventive Medicine, 40*(6), 690–698. https://doi.org/10.1016/j.amepre.2011.01.020

Supran, G., & Oreskes, N. (2017). Assessing ExxonMobil's climate change communications (1977–2014). *Environmental Research Letters, 12*(8), Article 084019. https://doi.org/10.1088/1748-9326/aa815f

Tan, D., & West, N. V. (2023). Bad medicine: Litigation, competition, and the marketing of prescription opioids. *Strategic Management Journal*. https://doi.org/10.1002/smj.3509

Tangari, A. H., Kees, J., Andrews, J. C., & Burton, S. (2010). Can corrective ad statements based on U.S. v. Philip Morris USA Inc. affect consumer beliefs about smoking? *Journal of Public Policy & Marketing, 29*(2), 153–169. https://doi.org/10.1509/jppm.29.2.153 (withdrawn)

U.S. Department of Justice. (2020, November 24). *Opioid manufacturer Purdue Pharma pleads guilty to fraud and kickback conspiracies* [Press release]. https://justice.gov/opa/pr/opioid-manufacturer-purdue-pharma-pleads-guilty-fraud-and-kickback-conspiracies

U.S. Department of Justice. (2022, December 6). *Court issues order requiring cigarette companies to post corrective statements; resolves historic RICO tobacco litigation* [Press release]. https://www.justice.gov/opa/pr/court-issues-order-requiring-cigarette-companies-post-corrective-statements-resolves-historic

United States v. Philip Morris USA Inc., 449 F. Supp. 2d 1 (D.D.C. 2006).

United States v. Purdue Frederick Co., No. 1:07CR00029 (W.D. Va. July 23, 2007).

van der Linden, S., Leiserowitz, A., Feinberg, G., & Maibach, E. (2015). The scientific consensus on climate change as a gateway belief: Experimental evidence. *PLOS ONE, 10*(2), Article e0118489. https://doi.org/10.1371/journal.pone.0118489

Van Zee, A. (2009). The promotion and marketing of OxyContin: Commercial triumph, public health tragedy. *American Journal of Public Health, 99*(2), 221–227. https://doi.org/10.2105/AJPH.2007.131714

Villanti, A. C., Peasley-Miklus, C., Mercincavage, M., Mays, D., Donny, E. C., Cappella, J. N., & Strasser, A. A. (2025). Effect of nicotine corrective messaging on nicotine-related beliefs in US adults: A randomised controlled trial. *Tobacco Control, 34*(2), 162–168. https://doi.org/10.1136/tc-2023-058252

Wells, G., Horwitz, J., & Seetharaman, D. (2021, September 15). The Facebook Files: Facebook knows Instagram is toxic for teen girls, its research shows. *The Wall Street Journal*.

Yakubi, H., Gac, B., & Apollonio, D. E. (2022a). Industry strategies to market opioids to children and women in the USA: A content analysis of internal industry documents from 1999 to 2017 released in State of Oklahoma v. Purdue Pharma, L.P. et al. *BMJ Open, 12*(11), Article e052636. https://doi.org/10.1136/bmjopen-2021-052636

Yakubi, H., Gac, B., & Apollonio, D. E. (2022b). Marketing opioids to veterans and older adults: A content analysis of internal industry documents released from State of Oklahoma v. Purdue Pharma, L.P., et al. *Journal of Health Politics, Policy and Law, 47*(4), 453–472. https://doi.org/10.1215/03616878-9716712

Yang, B., Massey, Z. B., & Popova, L. (2022). Effects of modified risk tobacco product claims on consumer comprehension and risk perceptions of IQOS. *Tobacco Control, 31*(e1), e41–e49. https://doi.org/10.1136/tobaccocontrol-2020-056191
