

Dear Editorial Board

We wish to submit this Letter to the Editor entitled “Forensic Empirical Analysis on Influx of Suspicious Survey Responses on “Reality Check on Weight Loss Supplements for Youth 12 - 22 Years Old (April 2021 youth-led survey)” for consideration by the journal.

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

Eating disorders have become extremely prevalent in recent years especially in those between the ages of 12 to 18. A big proponent of this is the easy access to muscle building and weight loss supplements. Currently, no state has taken action to put restrictions on the sale of these supplements, so we, as students, advocated for legislation that would ban the sale of muscle-building and weight loss supplements to those under the age of 18. We sponsored a bill in California to ban weight loss supplements and worked on similar bills in both New York and Massachusetts.

We conducted youth surveys throughout the life cycle of these bills to gauge youth interest in passing them and to collect data on weight loss and muscle-building supplement use. As Mahmoud Abdellatif, Ryan Ahmed, and Alan Shnir are still students in high school, we believe that a student-led survey would be best to connect with fellow youth all across the country. Our survey was launched on April 14th, 2021, and we have collected 396 California youth responses between April 14th and April 24th. On Sunday, April 25th, two days before a key hearing in the California Assembly Judiciary Committee, we detected a pattern of highly suspicious activity with survey submissions that appeared consistent with deliberate tampering. Responses within 1 minute intervals, all concentrated in 2 hour periods, have come between April 25th and May 1st. Suspicious responses also came in clusters at high rates from a concentrated number of California zip codes. In contrast, non-suspicious data came from a more diverse set of California zip codes relative to the number of responses. When conducting this survey we have garnered 1124 suspicious submissions.

We were aware of previous incidents where bots with malicious intent targeted online research surveys, such as an eating behavior survey conducted by a University of Minnesota researcher in 2020. As this survey is used to gauge youth voices from all across the country we needed to make sure this is an accurate result. Therefore, this letter indicates the conducted comprehensive forensic analyses to characterize suspicious patterns relating to: 1) the rapid speed of submissions over a short time period; 2) uniform endorsement of solely mono-ethnic and mono-racial categories; and 3) outsized opposition to AB 1341. As students we have experienced many of our friends and peers abuse substances like this and sadly develop eating disorders and from April to this day we have heard many stories about this and it is truly sickening. We are worried as students that our peers, friends, and family could be next from this and suspicious data hinting at a sabotage of a potential bill is all it takes to dilute the efforts of hundreds of youth all across the country.

I declare that to the best of my knowledge my co-author and I have no proprietary, financial, professional, or other personal interest in any product, service, and/or company that could be construed as influencing the material proposed for presentation in our work.

Please address all correspondence concerning this manuscript to us at info@socioeconlabs.org. Thank you for your consideration of this manuscript.

Sincerely,
Ryan Ahmed
Mahmoud Abdellatif

**Forensic Analysis on Influx of Suspicious Survey Responses on
“Reality Check on Weight Loss Supplements for Youth 12 - 22 Years Old”**

Letter to the Editor

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Conflict of Interest

All authors have no conflict of interest to report.

Letter to the Editor

Forensic Empirical Analysis on Influx of Suspicious Survey Responses on “Reality Check on Weight Loss Supplements for Youth 12 - 22 Years Old (April 2021 youth-led survey)”

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Affiliation: ¹International Socioeconomics Laboratory

The International Socioeconomics Laboratory (ISL) is a student organization dedicated to engaging high school and college students in policy action by leading empirical research on socioeconomic issues and using findings to generate translational impacts. One such issue is the disastrous effects of weight-loss supplements on children. ISL conducted an online survey to give California youth a voice in deliberations among state lawmakers over Assembly Bill 1341,¹ which would prohibit the sale of harmful over-the-counter diet pills to people younger than 18 years. While the American Academy of Pediatrics strongly cautions against teens using these products,^{2,3} industry lobbyists have actively opposed this legislation.

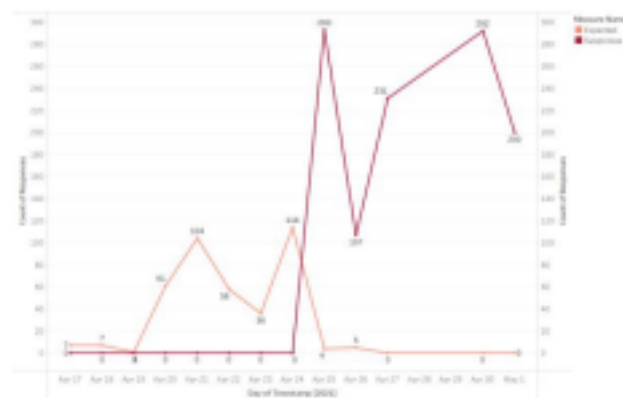


Figure 1. Daily response count, Expected vs. Suspicious

Our survey launched on April 14th, 2021, and received 396 responses from California youth through April 24th. These will be referred to as “expected” responses throughout this paper. Beginning Sunday, April 25th, two days before a key hearing in the California Assembly Judiciary Committee, we detected a pattern of highly suspicious activity with survey submissions that appeared consistent with deliberate tampering (Figure 1). These responses, hereafter referred to as “suspicious” responses, were all submitted within less than 1 minute of each other, in concentrated 2 hour periods between April 25th and May 1st. Suspicious responses also came in clusters at high rates from a concentrated number of California zip codes (286 unique zip codes). In contrast, expected data came from a more diverse set of California zip codes (237 unique zip codes) relative to the number of responses. Even though suspicious data came from more zip codes than expected data, there were 1124 suspicious submissions, meaning that two expected responses had a higher chance of coming from a unique zip code than two suspicious responses.

We were aware of prior incidents where online research surveys were targeted with bots by malicious actors, such as an eating behavior survey by a University of Minnesota researcher in 2020.⁴ Therefore, we conducted comprehensive forensic analyses to characterize suspicious patterns relating to: 1) the rapid speed of submissions over a short time period; 2) uniform endorsement of solely mono-ethnic and mono-racial categories; and 3) outsized opposition to AB 1341.

1) Timing Differences Between Suspicious Data and Expected Data:

Suspicious entries were submitted in roughly two-hour blocks once per day from April 25 through May 1, whereas expected data were submitted anytime during the hours of 6 am to midnight Pacific time (Figure 1). In addition, the average time between submissions and mean absolute deviation for the suspicious data was 26 seconds and 5 seconds compared to 23 minutes and 80 minutes for expected data, respectively.

2) Race/ethnicity of Suspicious Data and Expected Data:

Unlike the expected data, the suspicious responses had no mixed races/ethnicities, which would have required the respondent to check more than one race/ethnicity option when completing the survey, and the six single race/ethnicity groups were of near-uniform frequency (Figure 2). Chi-square test results indicated a significant difference ($p < 0.0001$) in the racial/ethnic makeup of suspicious versus expected responses. It is plausible that a malicious actor would choose only one race/ethnicity option to streamline and quicken the pace of survey submission.

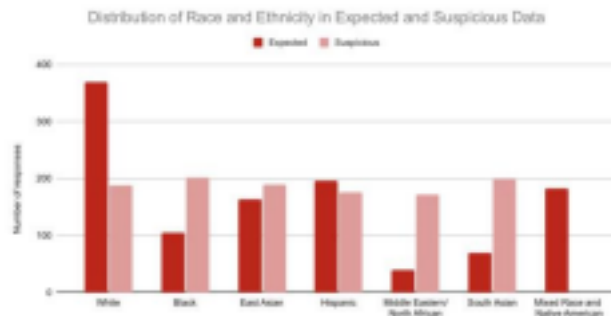


Figure 2. Ethnic and Racial differentiation of Suspicious data vs. Expected data

3) Opposition to Prohibiting Sale of OTC Diet Pills in Suspicious Data and Expected Data: In the suspicious data responses, the ratio of participants in favor of keeping OTC diet pills versus those in favor of prohibiting the sale to minors was 0.875:1, while the ratio among expected responses was 20:1, in favor of prohibiting the sale of OTC diet pills (Figure 3).



Figure 3. Suspicious and Expected Submissions for the survey question: Do you believe companies should be restricted from selling over-the-counter weight loss supplements to minors under the age of 18?

In conclusion, our forensic analysis strongly suggests that a malicious actor, perhaps utilizing a bot, may have tried to undermine youth-led policy advocacy on legislation directly affecting adolescent health by submitting fraudulent data to ISL's youth survey. Youth and adults working to advance youth civic engagement on health policy issues should guard against possible online targeting by opposing actors.

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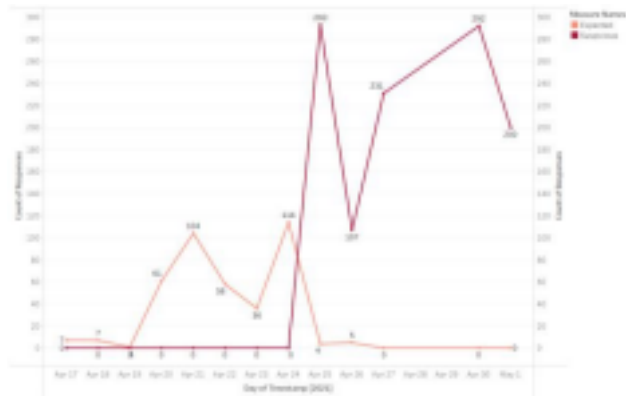


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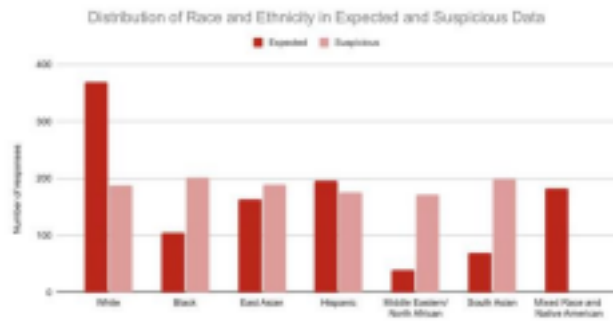


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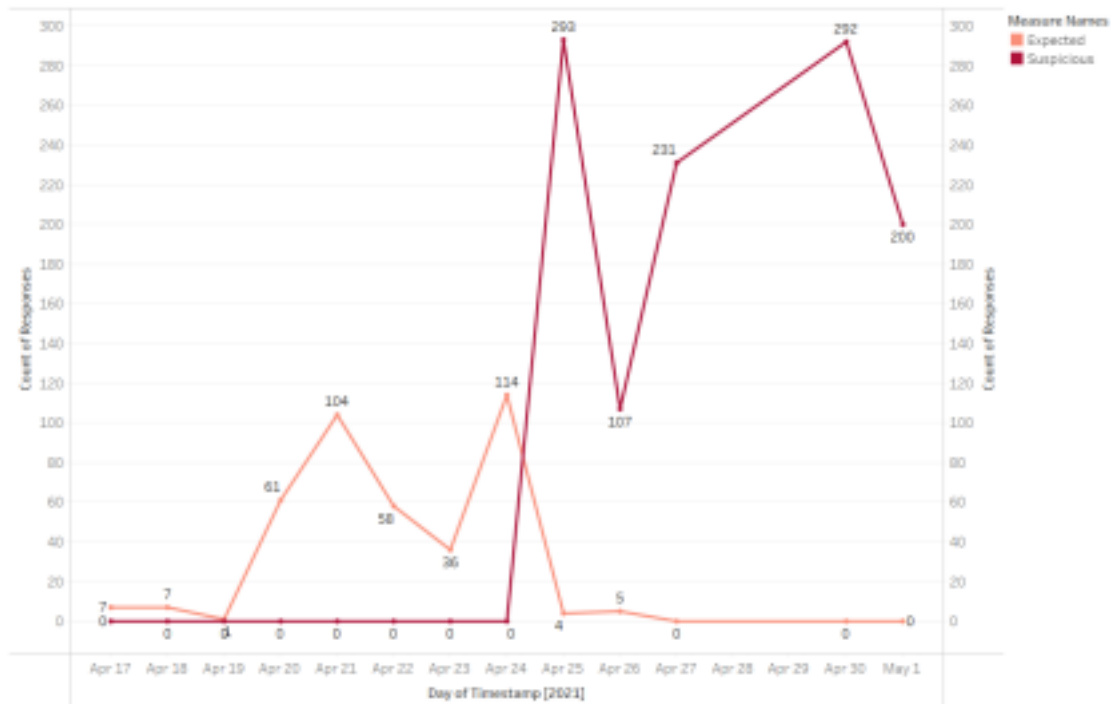


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Figure 2. Ethnic and Racial differentiation

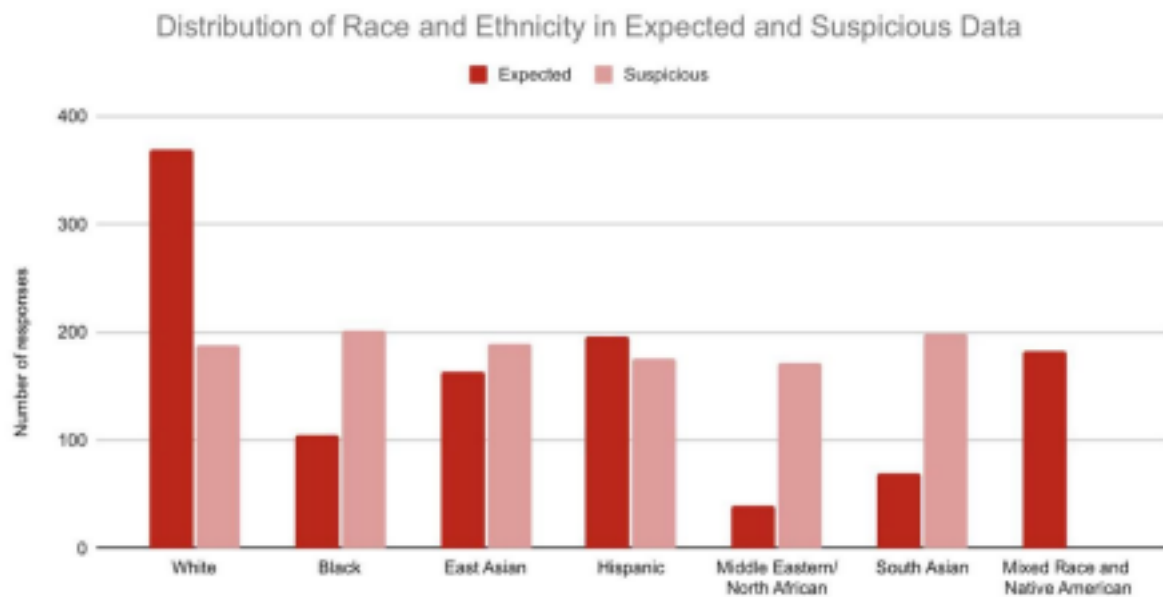


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Figure 3. Should the Sale be Restricted?



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