White Lies: The Real Cost of Titanium Dioxide in Food

Alena Ivanouskaya, Jenna Motylev

[1]High School, James Madison, NY 11229

[2] High School, James Madison, NY 11229

Abstract

The adverse effects of consuming Titanium Dioxide (TiO_2) nanoparticles (NPs) are concerning, as research has shown that these particles accumulate in the body over time, leading to a variety of harmful outcomes including genotoxicity, neurological damage, and psychological impacts. Adolescents are particularly at risk, since they consume snacks, candies, and processed foods that contain TiO_2 the most. The compound is used for its bright, white, and smoothening qualities, making products appear more visually appealing. However, these benefits can lead to long term health issues. Despite the significant quantity of evidence emphasizing its dangers, there is a lack of federal regulation in the United States, and food labeling often doesn't include the transparency of TiO_2's presence to consumers. In contrast, the European Food Safety Authority (EFSA) recognized these risks and banned the use of TiO_2 in the European Union in August 2022, signifying an important example that questions why similar action has not been taken yet in the U.S.

To better understand how adolescents respond to information about TiO_2, we conducted a survey with 409 responses from students in our school and neighborhood. Using statistical analysis, we found a significant association between the factors adolescents prioritize when buying snacks and their reactions after learning more about the health risks of TiO_2. Furthermore, the adolescents who expressed greater concern about their consumption of TiO_2 were also those who prioritized taste over appearance when purchasing snacks. This finding suggests that the visual appearance provided by TiO_2 is not essential for customers' consumptions since

adolescents care more about how food tastes rather than how it looks. This information is important for public health advocacy, as it demonstrates that removing TiO_2 from food products would not negatively impact the satisfaction of consumers.

Additionally, we designed and carried out a single-blinded experiment using pre and post-surveys about our educational presentation on TiO_2. The results showed that awareness plays a crucial role in shaping informed decision making. Many participants who had initially little knowledge of TiO_2 significantly shifted their attitudes after receiving clear and accessible information. This data supported the idea that public education can reduce consumption of harmful additives before formal policy changes are installed. To optimize the spread of this information, we created a website summarizing TiO_2's health risks, scientific research findings, and current policy actions, making it more accessible to both adolescents and the general public.

Furthermore, we conducted interviews with three experts within public health and regulatory policy. We discussed EFSA's decision-making process, the scientific reasoning behind the ban in Europe, and the political and economic barriers to similar actions in the United States, particularly in New York City. Moreover, we explored implementing local bans or mandatory warning labels as initial steps before a federal ban could be considered in a follow-up interview with one expert.

Long term, our project aims not only to continue raising awareness but also to advocate for stronger policy changes on the federal level. The European Union's actions show that regulating TiO_2 is both possible and practical. By combining our experimental results, we hope to contribute to prioritizing health over appearance in the food industry. Ultimately, our goal is to

ensure that adolescents and consumers can make informed choices free from the hidden dangers of Titanium Dioxide nanoparticles.

Introduction

Titanium Dioxide (TiO_2) is a synthetically manufactured pigment and additive in cosmetics, pharmaceuticals and food, discovered in the late 18th century, and approved in the 1960s by the FDA. There are three synthetically occurring TiO_2 polymorphs (existing in more than one crystalline form): anatase, rutile and brookite. However, anatase and rutile are the primary forms used in commercial products, with anatase being more prevalent in food and pharmaceuticals due to its brightening properties. TiO_2 was mass produced and became a staple in the early 20th century, especially in candies, chewing gum, baked goods, and dairy products. In the food industry, it is used as a white color and smooth color enhancer. As a result, adolescents are highly exposed to TiO_2 NPs due to their frequent consumption of processed snacks, candies and dairy products. Despite the FDA regulating TiO_2 as safe in food, the nanoparticles (NPs) disrupt gut health, and trigger inflammation by gathering in the organs. With the growing concern of the adverse long term effects, the EU has banned it specifically as a food additive. Through exposure to TiO_2 NPs, adolescents can experience genotoxicity, neurotoxicity, and psychological reactions making this a pressing social and health issue.

A major contributing factor to the dangerous effects of TiO_2 is its size. When used, it is typically manufactured in nanoparticles (NPs), which contributes to the opacity (ability to reflect light). This is the main reason why it is used in food products as it produces a shiny look. TiO_2 NPs need to be approximately between 200 and 300 nanometers in diameter — half the size of visible light waves — allowing them to reflect light in multiple directions (Warheit 2024). The

smaller TiO_2 nanoparticles have an increased surface area compared to its larger counterparts, leading to greater influence with human cells. Due to this, they are classified as carcinogens, according to the International Agency for Research on Cancer, which raises a similar question of its genotoxicity, since DNA damage may have resulted in somatic mutations (changes in the DNA of non-reproductive cells) in the initiation step of cancer progression. (Carriere, et al., 2020)

Genotoxic effects

TiO_2 NPs are associated with severe concerns regarding genotoxicity — the ability of a substance to damage DNA — adversely affecting DNA leading to potentially harmful cellular damage. (Bandyopadhyay, et al., 2010) This study revealed that TiO_2 NPs are more genotoxic compared to larger particles , due to their ability to penetrate cells more easily, both in the nucleus and cytoplasm. Particularly, the anatase form of TiO_2 NP has been shown to trigger more detrimental effects than other crystalline forms, such as rutile. Despite the difference, both forms still induce adverse effects. Furthermore, TiO_2 NPs can impair cellular DNA repair mechanisms, by inactivating the Nucleotide Excision Repair and Base Excision Repair pathways, which are essential for correcting DNA damage. Short term exposure to TiO_2 NPs can increase the production of Reactive Oxygen Species, leading to oxidative stress, cell death, and DNA damage (Bandyopadhyay, et al., 2010). However, long term exposure can cause chromosomal instability and cell transformation further increasing the risk of cancer development, loss of cellular function, and genetic mutations.

Neurological effects

Another serious concern regarding TiO_2 NPs is the potential neurotoxicity, as long term exposure can adversely affect the Central Nervous System. Hong and his colleagues conducted

an experiment in 2004 testing the effect Titanium Dioxide has on the hippocampal neuroinflammation in mice, and they examined the severity of memory and attention loss. The mice in the three treatment groups, compared to the control group, exhibited an over-proliferation of glial cells (abnormal growth of glial cells), necrosis (cell death), abscission of perikaryon (separation and injury to the cell), shrinkage of cell volume, and nuclear irregularity (Sun et al. 2023). This information revealed that TiO_2 NPs could cross the blood-brain barrier and cause neuroinflammation, causing impaired spatial memory and reduced physical activity. These results proved to be significantly important as the genetic makeup of mice and humans share similarities, the risk of the aforementioned impact heightens.

Psychological effects

TiO_2 NPs' ability to cross the blood-brain barrier also raises concerns about their impact on mental health. Once in the brain, TiO_2 NPs can induce oxidative stress, promote neuroinflammation, and disrupt brain biochemistry, ultimately impairing neuronal function and structure (Zhang, et al., 2023). Oxidative stress damages cells by creating an imbalance of harmful molecules, while neuroinflammation is the brain's immune response that, if prolonged, can lead to cognitive decline. Disrupting brain biochemistry affects neurotransmitters, potentially impairing learning, memory, and mood. These effects may contribute to psychological disorders and could play a role in the development of neurodegenerative conditions, such as Alzheimer's or Parkinson's disease. (Zhang, et al., 2023) The severity of neuronal damage caused by TiO_2 NPs depends on the particle dose and the particle size as smaller particles are more likely to penetrate deeper into tissues. (Zhang, et al., 2023) Furthermore, this poses a significant risk for adolescents as they commonly use sunscreen, cosmetics, or food products, which contain TiO_2

NPs and this could interfere with cognitive functions and memory. Adolescents are particularly vulnerable to these effects as their brains are in critical stages of development.

Government laws and regulations

To counteract health concerns, the EU banned TiO_2 as a food additive in January 2022. Regulated by the European Food Safety Authority (EFSA), the ban indicates that it may be unsafe for consumption in food products. Under current European Commission rules, foods containing nanoparticles should be labeled accordingly. In contrast, U.S. regulations allow manufacturers to omit TiO_2 from labels due to legislative exceptions, such as when additives serve no function or make up less than 25% of the final product (Jovanović 2015). TiO_2 is also sometimes classified as a manufacturing aid, further exempting it from labeling. (Jovanović 2015).

TiO_2 nanoparticles in food average 110 nm, with at least 36% under 100 nm and a particle range of 30 to 400 nm (Weir et al. 2012). Their small size allows them to cross blood-brain barriers, potentially accumulating in organs like the liver and brain. Yet, in the U.S., such formations don't meet the current criteria for nanotechnology labeling. Since TiO_2 remains registered as an inactive ingredient, manufacturers can continue using it without disclosure. (Jovanović 2015)

Though TiO_2 appears on the FDA's GRAS (generally recognized as safe) list, its safety is questionable due to the long-term adverse effects. GRAS allows companies to self-certify ingredients without FDA review, meaning substances like TiO_2 can enter the market without full oversight (Vogel et al. 2017). The FDA cannot re-evaluate these additives unless harm is proven, limiting its regulatory power.

The lack of transparency affects adolescents, who often choose snacks based on taste and appearance, unaware they contain TiO_2. Improved labeling, public awareness, and stricter regulations, similar to the EU's approach, could influence consumer choices and promote safer alternatives.

Description / Methodology / Proposed Research Approach

Based on the background research, TiO_2 NPs are daily consumed among adolescents without having an accurate understanding of the food additive itself. TiO_2 NPs could cause neurological damage, cell degeneration, behavioral disorders, memory issues, and so on, in the future if enough is consumed. The exact number remains unknown as every individual exhibits different bodily functions. Our aim for the field research was to determine that consumption rates were highest among adolescents and the correlation between adolescents' understanding of TiO_2 NPs in food products and its influence on their food choices. From our results, we expected to find out that those who know more about the TiO_2 food additive are less likely to consume foods that contain it.

Our field research consisted of three questionnaires. The first questionnaire was a voluntary survey with 9 questions. The parameter of interest was all adolescents ranging from 12 to 20 years old. Within these questions, there were 4 main categories: consumption habits (consumption of processed snacks and how frequently), snack choice influences (most important factor and checking of ingredient labels), awareness and understanding (heard of TiO_2 and whether they know its use), and the behavior and risk attitudes (scientific studies and EU ban). The sample consisted of 409 adolescents from various schools. To carry out our study, we asked teachers to post the survey in their google classrooms, created posters that were hung up all over our neighborhood as well as in nearby stores, and posted it in community group chats for the

programs we participate in. These methods of distribution were done to maximize the diversity of responses we received.

Firstly, we interviewed Council Member Narcisse Mercedes, who is a registered nurse and she holds a position on the Chair of the City Council's Committee on Hospitals. Our interview was over email and consisted of an intersection of public health policy and food safety regulation, specifically regarding the use of TiO_2 NPs as a food additive. Narcisse mentioned that food safety regulations are largely governed at the federal level, but local governments can advocate for stricter regulations and help ensure that our communities stay informed and educated about the harmful food additive: TiO_2 NPs. Her office specifically prioritizes food safety by staying informed on emerging health concerns and working with health experts to address issues that affect our community's well-being. Furthermore, to educate the public if concerns about TiO_2 NPs gain traction in the community, Narcisse suggested holding community forums and collaborating with public health organizations to share information. She highlighted that education is key to ensuring that constituents are aware of potential risks and know where to turn for more information. Additionally, her office could initiate petitions, gather public support, and work with other lawmakers to push for stricter regulations at the state or federal level. Previously, she had supported initiatives to improve food labeling and advocated for stronger consumer protection laws to ensure public safety, and she routinely works closely with healthcare professionals to address concerns within our community.

Afterwards, we interviewed Paul Westerhoff, a researcher at Arizona State University via zoom call. During the interview, he specifically talked about the potential negative aspects of completely substituting TiO_2 NPs. TiO_2 NPs is not only used as a whitening agent, but also as a smooth buttery texture. TiO_2 NPs are currently mixed with oils/fats to produce the desired

texture. However, if we were to completely substitute TiO_2 with fats and oils, that wouldn't necessarily be much more beneficial. Alternatively, if we were to replace TiO_2 with a different chemical, that also may not be very beneficial. TiO_2 has been continuously used since the 1900s and therefore, there is a lot of research concerning the chemical which can be the same for any potentially new chemicals. Although he talked about the potential negatives of banning TiO_2 completely, he did say that banning the NP form could be beneficial. If we were to keep the particles to a size that would exceed the NP metrics then the risk of the adverse effects would decrease as less particles would accumulate in our body. Tying back to our background research, the small size of the NP is specifically dangerous. This information supported our implementation to try to ban TiO_2 NPs specifically.

Lastly, we interviewed Gabriele Aquilina, a specialist in genotoxicology who works for the EFSA (European Food Safety Authority). We conducted the interview via Google Call to gain insight into how food additives, including TiO_2, are regulated and assessed in the European Union as well as the genotoxic aspects. He explained that EFSA is composed of several expert panels, each focused on a specific area. For several years, he served as a member of the panel on food additives and the products that use them. He emphasized that monitoring the safety of food additives is critical not only for human health, but also for animal health, as animals contribute to the food supply through products like milk, eggs, and meat. Dr. Aquilina described the EFSA's process for evaluating food additives. He and his colleagues receive documents containing all available studies on the additive. Based on this information, they are responsible for drafting an official opinion on whether the additive is considered safe for human consumption. If the panel determines that further information is needed or if the additive is found to be unsafe, restrictions are recommended. He clarified that EFSA doesn't perform laboratory tests itself. Instead, it

receives test data from laboratories that are under strict regulation of authority. These labs provide complete study reports, which the EFSA panel carefully reviews to assess the reliability of the studies and determine whether the evidence is sufficient to draw conclusions. Regarding nanoparticles, Dr. Aquilina noted that the study of their toxicity is a relatively recent development, emerging as a significant concern around 2015. He explained that nanoparticles, due to their extremely small size, can enter cells through a process called endocytosis: the method by which cells engulf particles from their environment using their cell membrane. Once inside, some nanoparticles remain in the cytoplasm, while others can enter the nucleus and potentially come into contact with DNA. His expertise provided an understanding of how regulatory assessments are made and why nanoparticles, like TiO_2, have become a growing focus in food safety discussions.

Results of our Findings

Our first questionnaire was voluntary, thus there is possibly response bias as people choose to participate due to having strong opinions, more interest, or more awareness of the topic. This may result in an overestimate or underestimate of the population. 15.4% were ages 12-14, 73.8% were ages 15-17, and 10.8% were ages 18-20. Of the 409 people sampled, 85.1% have not heard of TiO_2 before this survey. When purchasing snacks, 64.8% chose taste to be the most important factor for them, while only 2.4% chose appearance to be the most important factor for them. This indicates that people don't value appearance, but companies still tend to manufacture the appearance and texture using food additives like TiO_2 57.7% consume dairy-based desserts, 50.1% consume chewing gum, and 39.1% consume candy at least once a week. Overall, 46.5% consume processed snacks a few times a week and 24.2% consume processed snacks multiple times a day. When informed of the risks of TiO_2, 46.2% said that they

would try to avoid these products and 47.2% said that they would reduce their consumption. Knowing that the European Union banned it, 62.1% think that the FDA should ban TiO_2 NPs as well. To initiate the ban, we linked a petition at the end of our survey advocating to ban TiO_2 NPs in NYC.

Moreover, to determine whether there is an association between the factors adolescents prioritize when purchasing snacks and how they respond to health information about TiO_2, a chi-square test of independence was done, with a significance level of 0.05. The null hypothesis is that there is no association, while the alternative hypothesis is that there is an association. For the statistical test, there were three conditions: the randomness condition was not fully met as our survey was voluntary, the independence condition was met as the survey was limited to only 1 response per person, and all expected counts (except for 3) were greater than 5. After conducting a chi-square test of independence, our results were: $\chi^2 = 23.62058626$, p-value = 0.00061317076, df (degrees of freedom) = 6. A p-value of 0.00061317076 is statistically significant at the common alpha level of 0.05, and even at a stricter level like 0.01. There is strong evidence to reject the null hypothesis, which means that there is a statistically significant association between the factors adolescents prioritize when purchasing snacks and their response to health information about TiO_2. Furthermore, given that 189 adolescents reported they would avoid TiO_2 after understanding its long-term health effects, and that majority of them (108 or 57.1%) prioritize taste when purchasing snacks, this indicates that the addition of TiO_2 is unnecessary, as taste holds more influence than appearance in their decisions. However, there were 3 expected counts which were less than 5, which violates the Chi-Square test condition slightly. This means that the results should be interpreted with caution, but with a large sample size of 409, this partially offsets the issue.

Our second and third questionnaires were sent out during the single-blinded experiment, where 24 people voluntarily participated. Our experiment, conducted across multiple school clubs, began with a pre-survey that assessed participants' prior knowledge of TiO_2 and their ability to visually or intuitively identify its presence in gummies. Before the presentation, 66.7% of respondents had never heard of TiO_2, and 50% reported that knowing an ingredient is labeled as a "possible carcinogen" would influence their decision to consume it. Additionally, 50% believed that most food additives are unsafe. After learning about TiO_2, participants voluntarily sampled two types of gummy bears: Sample A (Haribo, containing TiO_2 NPs) and Sample B (organic, TiO_2-free). In the post-survey, 70.8% of participants correctly identified Sample A as the one containing TiO_2, primarily due to its shinier appearance. Furthermore, 79.2% of responders noticed a taste difference between the two samples, and 50% used both taste and appearance to make their conclusion. Importantly, all participants (100%) agreed that food brands should explicitly label whether their products contain TiO_2, demonstrating increased demand for transparency. Moreover, 83.3% of participants believe that brands should completely ban the use of TiO_2 NPs, reflecting more concern after being informed. These findings suggest that increasing awareness through education significantly impacts consumer perception, encouraging individuals to make more informed decisions about the food they consume. This also highlights a broader public desire for greater labeling transparency and potential policy change regarding TiO_2.

Discussions and Recommendations for future work

As of August 2022, the EU banned the use of TiO_2 NPs in food products, though they remain permitted in other industries. Following their ban, we recommend initiating a local ban in NYC, paired with warning labels, and expanding it to the federal level. Since the adverse health

effects are primarily linked to the nanoparticle form, banning only TiO_2 NPs would reduce harm while keeping food formulations largely unchanged. While potential substitutes do exist, they may not offer clear health benefits, making a targeted NP ban the most effective approach.

To begin implementation in NYC, we plan to reach out to local council members, who can help draft and advocate for a bill.Once the issue gains recognition, we aim to connect with congressional representatives and the House Committee on Energy's Health Subcommittee, which oversees food safety and FDA regulation. This committee would be essential in drafting a formal bill to propose on a national level, given TiO_2 current classification as "Generally Recognized as Safe" (GRAS) by the FDA.

We expect pushback from major corporations, as removing TiO_2 NPs reduces product quantity and yield, increases manufacturing costs, and disrupts existing production processes. Therefore, a same size yield would be more expensive to manufacture. Given TiO_2's widespread use, nationwide change will be financially inconvenient.

Furthermore, the field research indicates a strong association between awareness and avoidance of TiO_2-containing products. While education helps, it doesn't reach everyone. A warning label would encourage consumers to make informed decisions, and a ban would ensure widespread protection. Moreover, these measures represent the most efficient path to reducing TiO_2 NP consumption.

Implementation

Step 1: After our research on the current implementation in the EU, it was clear to us that the most effective way to limit the consumption of TiO_2 is to ban it in NYC, following the EU's ban.. To tackle this issue, we created a petition, which consisted of a blurb regarding the adverse effects of TiO_2 NP and the current implementations enforced overseas. If individuals were to sign

the petition, they would be supporting our forces to ban the food additive. We linked the petition into the initial survey used in our field research. Furthermore, we printed 50 posters with a QR code linked to the petition and hung them up around our neighborhood. To further maximize adolescents' signatures, we posted the petition on various reddit pages and group channels. We currently have 219 signatures supporting our implementation to ban TiO_2.

Step 2: We received 409 responses for the survey. As an incentive and to promote awareness, participants received titanium dioxide-free candy, reinforcing our study's objective and encouraging informed consumer choices. Statistical analysis showed a significant association between the factor adolescents prioritize when purchasing snacks and their response to TiO_2 health information, supporting our hypothesis. To further explore public perception of TiO_2 in food, we conducted a single-blinded experiment with club participants. We presented an 11-slide summary of our background research followed by a pre-survey assessing prior knowledge and opinions on TiO_2. Afterwards, participants sampled gummy bear from two unlabeled plates — Sample A (containing TiO_2) and Sample B (TiO_2-free). Informed consent was obtained, as the trace amount posed no harm. Participants then completed a post survey evaluating their likelihood to consume TiO_2 and observations between samples. Only my partner and I knew which was which, and a full debriefing followed.

Step 3: Based on the statistical results from the pre and post survey for the single blind experiment we saw how knowledge impacted likelihood to consume the product, supporting our notion educating individuals would be an effective way to directly counteract this issue. In hopes of optimizing the people we reached beyond our school, we created a detailed website. The website contains information about the neurological, genotoxic, and psychological adverse effects. Additionally, there is a summary of the current actions taken overseas as well as the lack

of actions in the US. Individuals of all ages are able to access this website and learn more about the adverse effects concerning TiO_2. This website currently has 178 views with some internationally from Georgia, France, and Italy.

Step 4: Although educating individuals may persuade them to stay away from these products, it is impossible to effectively reach the majority of adolescents. In the EU while they did ban TiO_2 NPs, companies were restricted from using TiO_2 in their products and therefore, found a substitute. Based on the insight gained from our interviews, instead of banning the product as a whole, we are advocating for banning specifically TiO_2, NPs. To implement this in the US, we emailed and texted 10 major candy companies. We emailed 9 companies: Mars Inc., General Mills Team, Kraft Heinz, Ferrero, Kellogg's, Unilever, Danone, Hormel Foods, Tyson Foods, and texted 1 company: Mondelez International. These are food companies known for having this food additive in their products. To further ban this on a legislative level, we emailed Council member Narcisse about creating a potential ban or warning labels on products containing TiO_2 in NYC. While banning the food additive completely could have unforeseen consequences, banning the nanoparticle form specifically would be all around beneficial. This ban would protect everyone from the white lies surrounding TiO_2.

Conclusions

In our background research, we discovered the genotoxic, neurotoxic, and psychological impacts TiO_2 can have on adolescents. We researched the difference in risk depending on the particle size and the overall regulation of this product world wide. Our recommendations would help to restrict TiO_2 NPs within the US, and create warning labels. teach people about my research in a friendly, collaborative environment. This fosters a healthy, safe atmosphere where adolescents, similar to those who regularly consume energy drinks can learn how they truly

impact you. While educating individuals did prove lower likelihood to consume products with TiO_2 NPs, it is impossible to reach everyone. Therefore, a ban and warning labels allows consumers to make an informed decision and limits the use of TiO_2 NP most effectively. Other communities can also replicate my project by visiting our website and finding our information. Furthermore, they can replicate our experiments and reach out to us for more information. We would then contact them back, and share our presentations, slides/research, along with any other information needed. This will ensure other communities have all necessary information at their disposal to replicate our implementation. Ideally, this would expand to other states and overseas.

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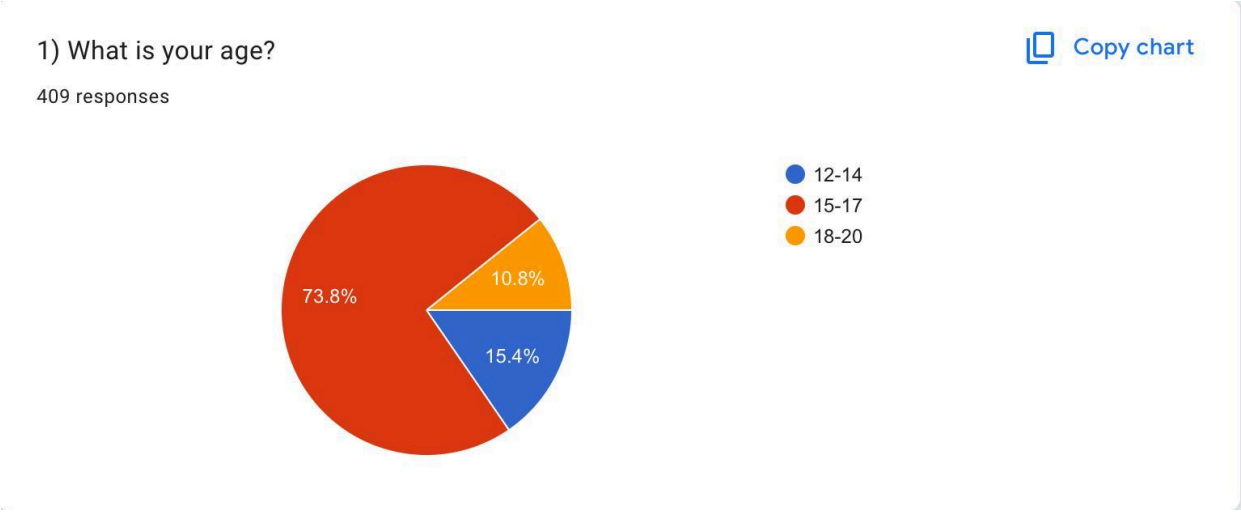
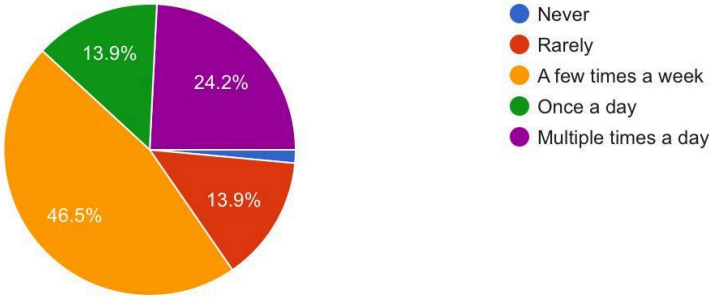
Figures/Charts/Graphs



Copy chart

2) How often do you consume processed snacks (e.g., chips, candies, chewing gum, baked goods, dairy-based desserts)?

409 responses



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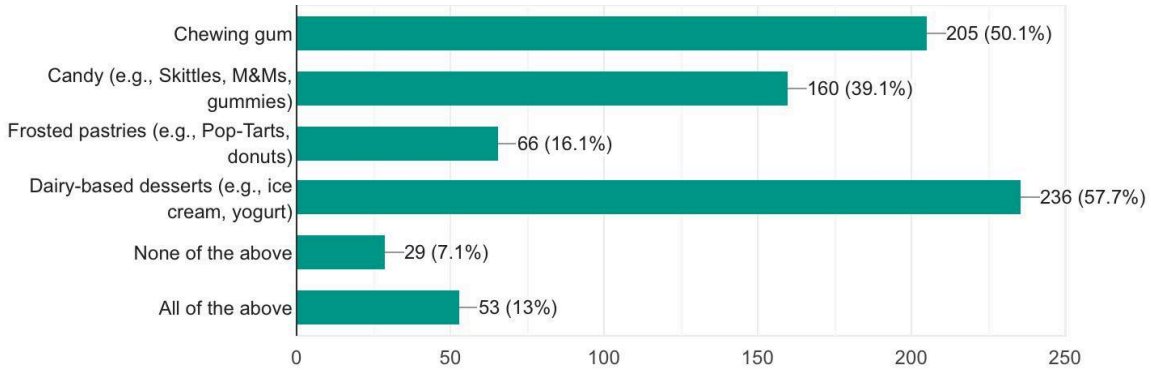
3) Which of the following food products do you consume at least once a week? (Select all that apply)

409 responses



4) When purchasing snacks, which factor is most important to you?

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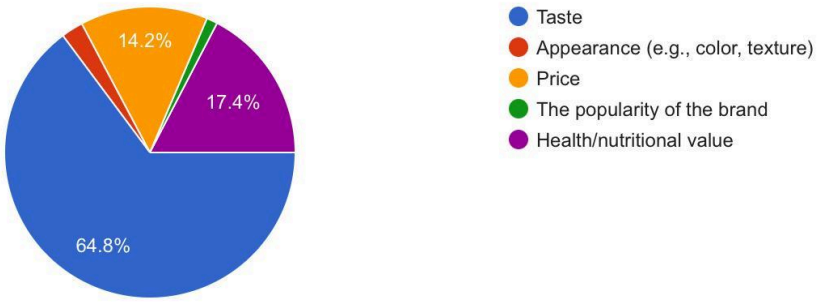
409 responses



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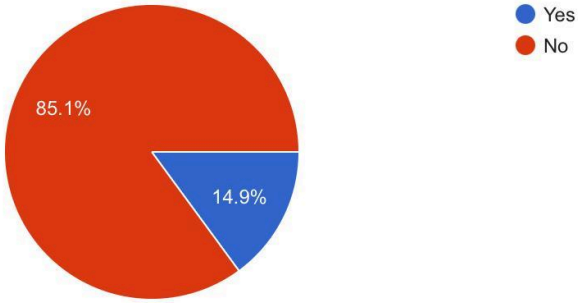
5) Have you heard of Titanium Dioxide (TiO2) before this survey?

409 responses



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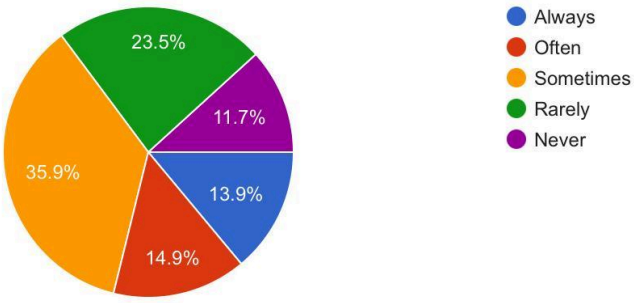
6) Do you check ingredient labels before buying snacks and other processed foods?

409 responses



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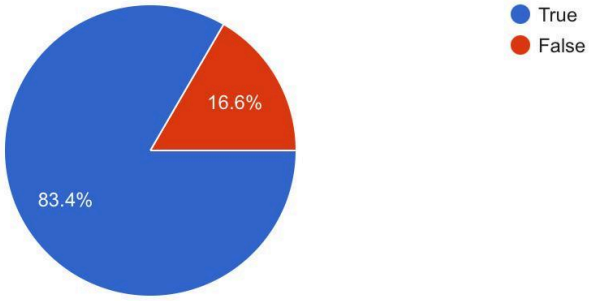
7) Titanium Dioxide (TiO2) is used in food products as a whitening agent

409 responses



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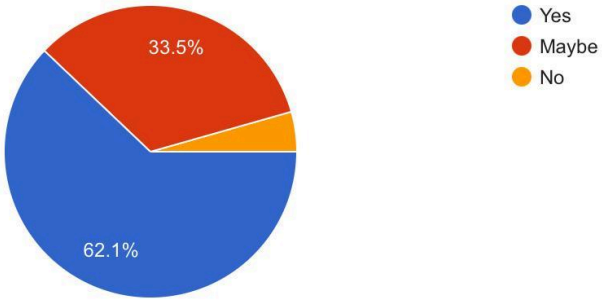
8) Scientific studies suggest that titanium dioxide (TiO2) nanoparticles may contribute to DNA damage, neurotoxicity, and psychological effects such as memory impairment (Zhang, et al., 2023). Does this information affect your willingness to consume products containing TiO2?

409 responses

9) The European Union banned TiO2 as a food additive due to potential health risks, but it is still approved for use in the U.S. By understanding these risks, do you think that the FDA should ban it?

Copy chart

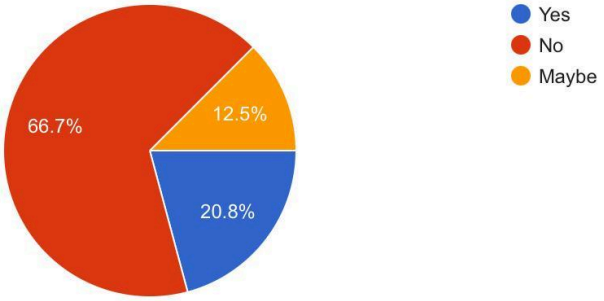
409 responses



1) Have you ever heard of titanium dioxide (TiO_2)?

Copy chart

24 responses



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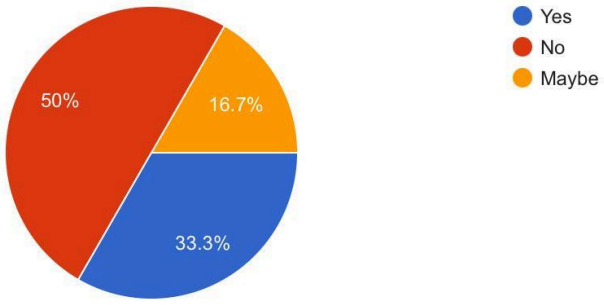
2) Are you aware that some food products can contain titanium dioxide?

24 responses



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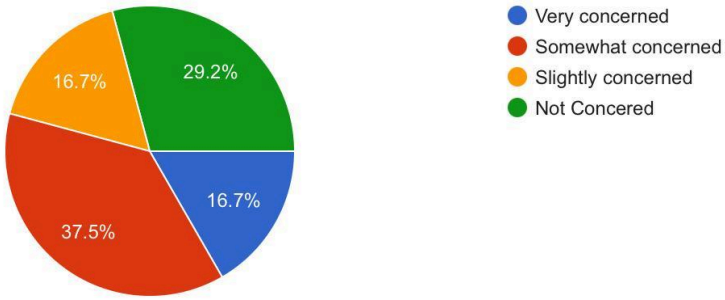
3) How concerned are you about the ingredients in processed snacks (like gummy bears)

24 responses



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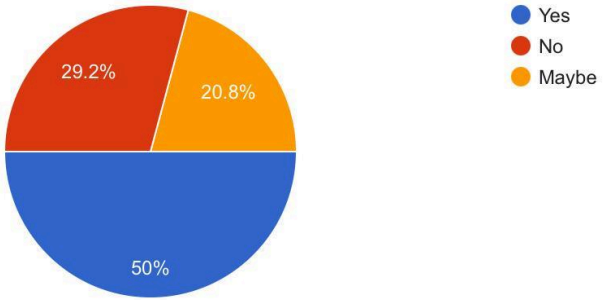
4) Would an ingredient being labeled as a “possible carcinogen” influence your decision to eat it?

24 responses



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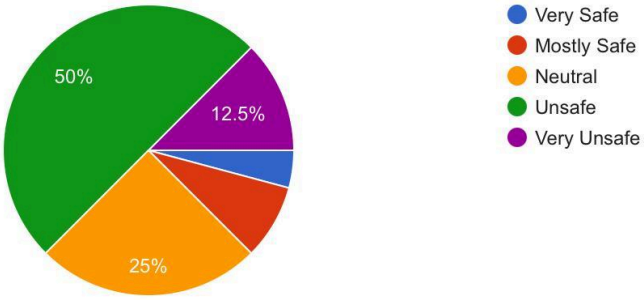
5) Based on what you know now, how safe do you think most food additives are?

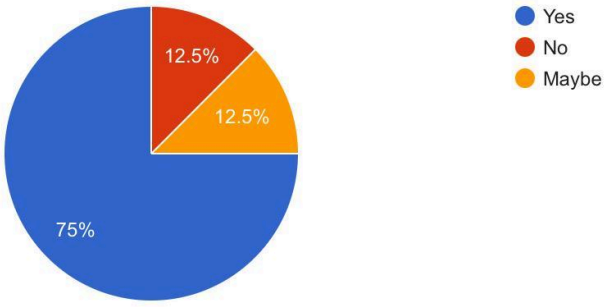
24 responses



6) Are you more likely to trust a food product from a familiar brand?

Copy chart

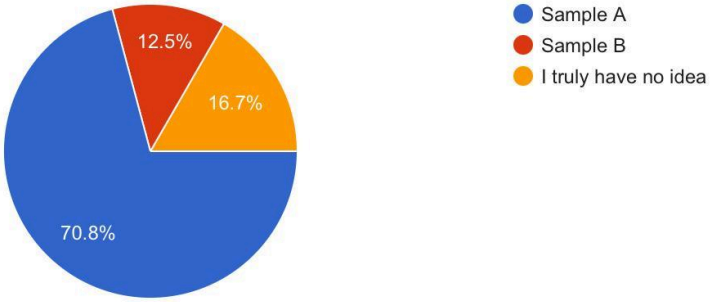
24 responses



7) Which sample do you think has TiO2 from appearance?

Copy chart

24 responses



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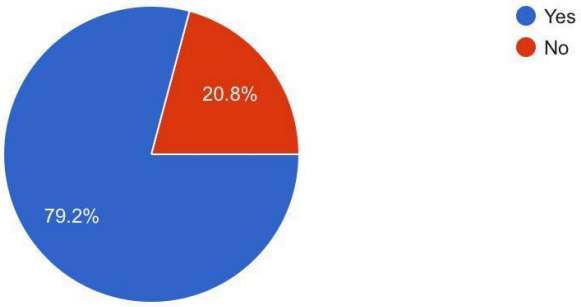
1) Did you notice any difference in taste between sample A and B ?

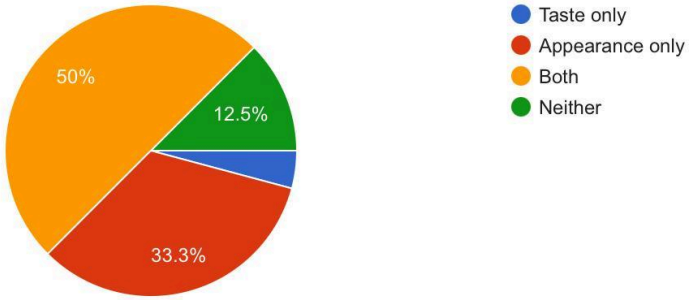
24 responses



2) Could you tell which gummy had titanium dioxide (TiO_2) just by taste or appearance

Copy chart

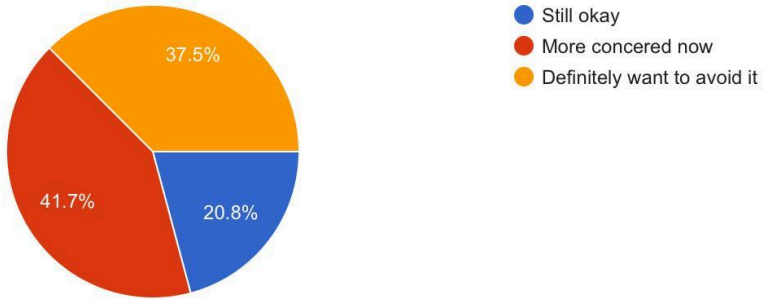
24 responses



3) Now that you know one sample contained titanium dioxide, how do you feel about eating products with it?

Copy chart

24 responses



4) Would you be more likely to buy a product that's labeled "TiO_2-free"?

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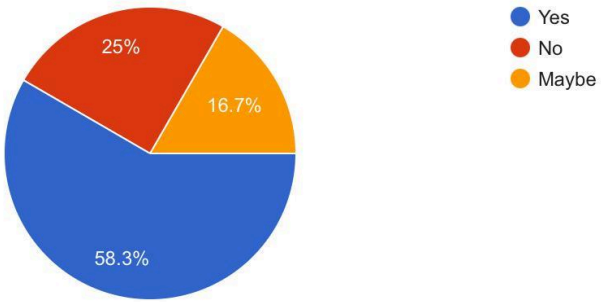
24 responses



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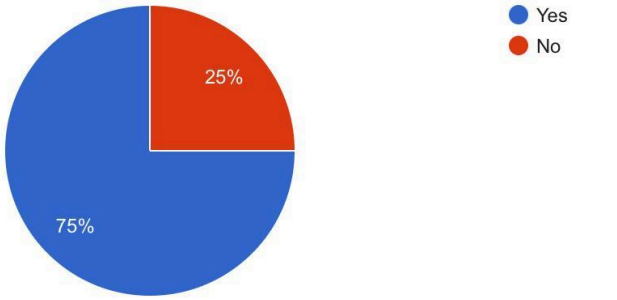
5) Has your opinion on food additives changed as a result of this experience?

24 responses



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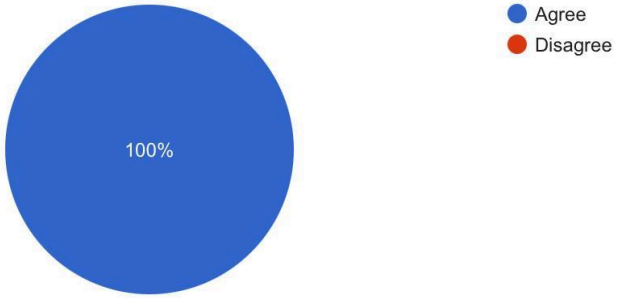
6) Brands should explicitly state if there is TiO2 in a product.

24 responses



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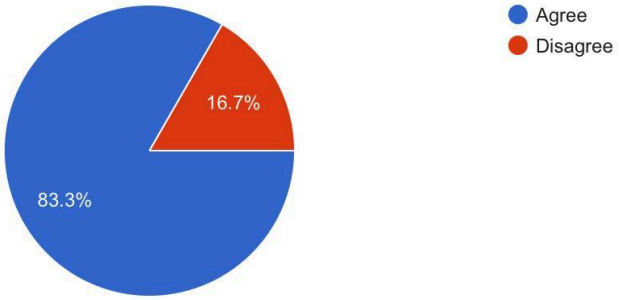
7) Brands should completely ban it.

24 responses



8) On a scale of 1-10 how effective did you feel this is.

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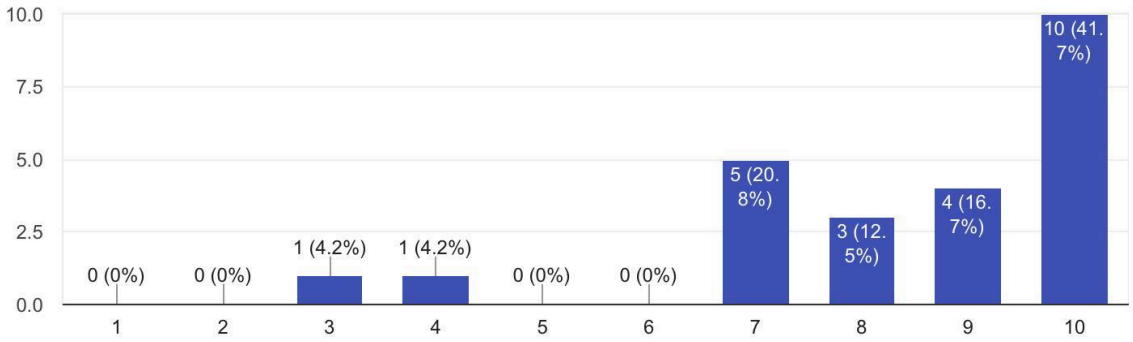
24 responses



White Lies: The Real Cost of Titanium Dioxide in Food

Impact on us

Titanium Dioxide is a whitening agent commonly used in the food industry

Click below to read up on the harmful effects

Try "Users last week"

Feb 17 – Apr 21
vs. Dec 15, 2024 – Feb 16

Views	Active users	Event count
178	129	573
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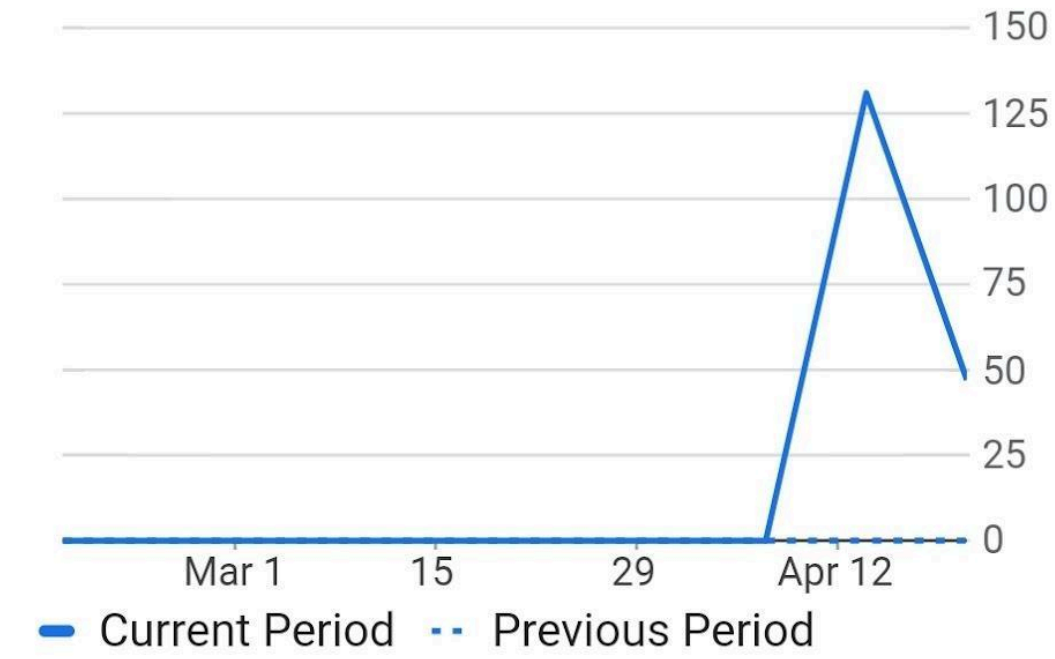
178 +178 (↑ –)



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YOUR VOICE COUNTS

Ban Titanium Dioxide (TiO2) Nanoparticles as a Food Additive in NYC

219 people have signed.

3%

Maxine K. signed just now

Adam B. signed just now

Did you know that the same snacks and candies you eat every day may contain a harmful additive linked to DNA damage, neurotoxicity, and inflammation?