Empirical Analysis of Consumers' Understanding of "All Natural" and Its Relationship to Genetically Modified Organisms [GMOs]

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Abstract

Food labeled "natural" or "all natural" is estimated to be a $40 Billion industry and that "all natural" is the second most-used claim on new American food products. The problem is that neither the FDA nor the FTC has ever defined the word "natural," preferring, at least from the FDA perspective, to give informal guidelines that a food product labeled "natural" should be one where nothing artificial or synthetic has been added or included that would not normally be in the food. Moreover, since the FDA has taken the position that genetically modified organism (GMOs) are "not substantially different from non-genetically modified foods," food marketers are not required to label their products if they contain GMOs. To address the issue, the historical background of "natural" labeling at the FDA, the FTC, and state legislatures and actions being taken related to GMOs are examined and then the results of an on-line survey of 800 consumers who buy items labeled "all natural" is described. The on-line survey assesses consumers' understanding of "all natural" and their perception of express and/or implied claims of "all natural" on a consumer product and their perceptions of GMOs. Policy implications that flow from these findings are also discussed.

Keywords: Consumer Behavior, Surveys, GMOs, All Natural, Regulations, FDA, FTC.

1. Introduction

Food labeled "natural" or "all natural" is estimated to be a $40 Billion industry (Esterl 2013), with 61% of consumers saying they had bought a product labeled "natural" in the last five grocery shopping trips and 50% of consumers say they seek out items with "all natural" on the label. (Food Labeling Poll 2007) Other data suggest that, in 2011 22% of the food items in a grocery store were labeled "natural" and that "all natural" was the second most-used claim on new American food products" (Negowetti 2013). The problem is that neither the FDA nor the FTC has ever defined the word "natural," preferring, at least from the FDA perspective, to give informal guidelines that a food product labeled "natural" should be one that "nothing artificial or synthetic has been included in or has been added to the food that would not normally be in the food." [58 Fed Reg. 2302, 2407, Jan. 6, 1993]. Similarly, the FTC proposed, but never adopted, a Trade Rule defining "Natural" as a food product that had "minimal processing or contained no artificial or synthetic ingredients" (FTC Staff Report, 1978, p. 225).

The difficulty in determining when a food product is "all natural" was magnified when genetically modified organism (GMOs) entered the food stream, particularly since the FDA has taken the position that GMOs are "not substantially different from non-genetically modified foods" and, most recently, the National Academy of Science, Engineering, and Medicine's release of a two-year study which concluded that "…the evidence suggests GMOs possess no substantial risk to human or environmental health (Huff post Newsletter, 2016). As a result, food marketers are not required to label their products if they contain GMOs (Federici 2010). US food marketers, taking advantage of this "gap" in disclosures, don't label their products as containing GMOs, resulting in estimates that 80% of processed foods contain GMO's (Helme 2013). On the other hand, consumer surveys have found that between 85% and 93% of respondents say that foods containing GMOs should be labeled (Kopici 2013; Consumer Reports 2014) and many countries, including the European Union and Japan, mandate GMO labeling of almost all food products. This has led to a dramatic decline of GMO products in European stores. (Federici, 2010; Helme 2013).

Given this "gap" in transparency regarding the meaning of "all natural" and the presence of GMOs in food, the questions become: 1) what does "natural" or "all natural" mean to consumers, both in an abstract sense and when they see it on a food label, 2) do consumers believe a food product labeled as "natural" contains GMOs, 3) is there a difference in perception in the meaning of "all natural" when it is an express claim on a label or implied from other claims on the label, and 4) would knowledge that products contained GMOs impact a consumer's decision to purchase those items? To address these questions, this paper has two parts: first, a brief review of the historical background of consideration of "natural" labeling at the FDA, the FTC, and state legislatures, and second, an on-line survey of 800 consumers who buy food items labeled "all natural" to determine: their understanding of "all natural," their perception of express and/or implied claims of "all natural" on a consumer product, their perception of any relationship between food products with an express or implied "all natural" claim and the presence of GMOs, and their likelihood of buying products if they knew the items contained GMOs. Finally, policy implications flowing from this analysis are discussed.

Historical Background

Regulation of "Natural." Both the Food and Drug Administration (FDA) and the Federal Trade Commission (FTC) have jurisdiction over labeling of products in the marketplace. The FDA's authority flows from the 1938 Federal Food, Drug, and Cosmetic Act (FDCA) which gave the agency authority over drugs, medical devices, cosmetics and, importantly, the authority to establish and promulgate reasonable definitions and standards of quality for food products, as well as the authority to prohibit false or misleading labels and to require that imitation foods be clearly labeled (Helme 2013). Moreover, the FDCA was amended in 1958 to give the FDA power to require pre-approval of substances added to food. Finally, in 1990 the Nutrition Labeling Education Act (NLEA) gave the FDA the authority to establish standards for such terms as "light," "healthy," "low fat." Under this authority, the FDA recognized that it had the authority to establish standards for "natural," but in 1991 declined to establish standards for "natural" (Negowetti, 2013). Rather, the FDA proposed a non-binding informal definition of natural as meaning that "nothing artificial or synthetic (including color additives) has been included in a food that would not normally be expected to be in the food" (58 Fed Reg. 2304 Jan. 6, 1993). The NLEA also gave the FDA the authority to grant an exception from labeling if the substance is "generally recognized as safe," where "generally recognized" is taken to mean "recognized and widely viewed as safe by experts in the field" (Kracov & Glasser 2012).

Like the FDA, the Federal Trade Commission (FTC) has jurisdiction over labels of food products. In 1978, FTC staff proposed a Trade Rule Regulation (Trade Rule) that a food could not be advertised as "natural" if it contained more than minimal processing or contained artificial or synthetic ingredients (FTC Staff Report 1978). However, in 1983 the FTC abandoned rule-making regarding the meaning of "natural" on food labels, deciding that claims such as "natural" were dependent on the context in which the "natural" claim was made and that, rather than a broad-based Trade Rule that would be applied to all claims, the claims would be evaluated on a case-by-case basis. (Negowetti 2013; Petty 2015).

Regulation of GMOs. In simplest terms, GMOs are plants that are created by genetic engineering, i.e., combining DNA from different species to create combinations that do not occur in nature (Monsanto 2011). The benefits of genetic engineering include that the plants can be engineered to become disease and drought resistant (thereby reducing the need for irrigation and pesticides and toxins in the growing process and encouraging soil conservation while increasing crop yield per acre) and genetically engineered foods can be "designed" to have a longer shelf-life, thereby lowering overall food costs because of less damage or waste (Federici 2010; Muller 2015). On the negative side, as noted by Muller (2015), since there have been no long term studies of the environmental or health effects of GMOs,"…concerns focus more on the uncertainty of genetically modified foods, effects on allergies, and effects on antibiotics."

The Grocery Manufacturers Association estimates that 75% to 80% of processed foods in supermarkets in 2013 contained GMOs (Helme 3013) and estimates from the Department of Agriculture are that that 93% of soy bean acreage and a similar percentage for some other crops used in processed foods was genetically modified (USDA 2013). Also, as noted above, the FDA, under the NELA, has the authority to decide whether GMOs meet the definition of an artificial or synthetic ingredient, and if it does, whether those ingredients need to be disclosed on food labels. The FDA had taken the position that GMOs "do not present any different or greater safety concern than foods developed through traditional plant breeding" (Helme 2013).

This position was reinforced in 2016 when the National Academy of Science, Engineering, and Medicine report concluded that "…the evidence suggests GMOs possess no substantial risk to human or environmental health" (Huffpost Newsletter, 2016). Therefore, from the FDA's perspective, firms selling products with GMOs are not required to disclose genetically modified ingredients on the label (Helme 2013) and that producers who wish to label their products as containing GMOs, or that their products do not contain GMOs, are free to do so if they follow non-binding, voluntary guidelines, including a guideline that the use of statements such as "GMO free" can't be used if the amount of genetically modified ingredients is above an unspecified level, which the FDA did not define (FDA Nov. 2015).

State Actions Regulating GMO Labeling. Given that the FDA has not required food processors to label products containing GMOs, a number of states have "stepped into the breach" and proposed or passed laws requiring GMO labeling. Noteworthy is California's proposed Proposition 37, titled "California Right to Know Genetically Engineered Food Act," which states that, for products sold in California (there is) "…a fundamental right of the people of California to be fully informed about whether the food they eat is genetically engineered and not misbranded as natural…" (Muller 2915 f/n 146).Similar propositions were put to Washington State and Oregon voters. However, all three measures were rejected by voters in those states, due in some part to the substantial promotional efforts by agro-chemical companies fighting the proposition (Helme 2013).

On the "other side of the ledger," in 2013 Connecticut passed a GMO labeling act which defined "natural food" as food that was "not treated with preservatives, antibiotics, or synthetic or artificial additives or flavoring, and …has not been genetically engineered." (Muller 2015). The Connecticut statute also required foods that have genetically engineered ingredients to be labeled "Produced with Genetic Engineering." Maine and Vermont have passed statutes similar to those in Connecticut and similar statutes have been introduced in other states, notably Colorado and New Mexico, but have yet to be passed (Muller 2015).

It is also noteworthy that the Connecticut statute has a "triggering" stipulation that the mandatory labeling law for genetically-engineered foods does not take effect until four other northeast region states enact GMO-labeling laws consistent with the Connecticut statute, including one state that borders Connecticut, and the aggregate population of those states exceeds twenty million. (Muller 2013 f/n 136). This is because of expected challenges to the statutes on the basis of violation of either the First Amendment to the Constitution (free speech) or the Commerce Clause (unrestricted/free interstate trade) (Helme 2013). On the other hand, the Vermont statute does not contain the "triggering" stipulation and becomes law in July, 2016 (WSJ 3/7/2016). The Vermont statute is also being challenged on constitutional grounds. Additionally, the US House and Senate are considering federal legislation which would establish voluntary GMO labeling standards and preempt state GMO labeling laws. Also, the FDA is currently seeking comments on whether to define "natural". (Arnold & Porter 2016).

Consumer Class Action Litigation. In addition to actions at the state level to regulate labeling of consumer products, numerous consumer class actions have been brought in order to derive a definition of "all natural" and to get a determination as to whether products containing GMOs and claiming to be "all natural" are misleading or deceiving consumers. As noted by Petty (2015), consumer class action litigations are "filling the regulatory void" left by the failure of the FDA to define "natural." According to Petty, in 2012 there were 85 natural food class action lawsuits filed. Among the companies sued are Gerber, Kellogg, General Mills, Frito-Lay, Campbell Soup, and Ben & Jerry's (Thompson 2014). However, as noted by Thompson "Ultimately, no court has yet issued a final ruling in any of these 'natural' class action lawsuits, mainly because the cases have been dismissed in the pleading stage or, if the plaintiffs succeed past the pleadings stage, companies have been eager to reach a settlement before having their day in court."

Consumer Perspective on Natural and GMOs. Consumers' perceptions of the meaning of "natural" and whether GMO's should be labeled are found in surveys and in some court decisions. Specifically, a 2014 Consumer Report poll found that 85% of consumers believe natural foods should not contain artificial ingredients, including GMO's (Consumer Reports 2014) and a 2013 New York Times poll found that 93% of consumers believe that foods containing GMOs should be labeled (NY Times 2103). These results are consistent with a 2005 Harris Interactive survey done for the Sugar Association which found that 85% of consumers believe foods containing artificial or synthetic ingredients were not natural (Sugar Association 2006). In response to opinions such as these, some marketers are taking action independent of what is done in state legislatures or the courts.

For example, Whole Foods has implemented a policy mandating the labeling of genetically modified food sold in its stores (Negowetti 2013 f/n 9) and Ben & Jerry's has announced that it would not use GMO ingredients in its ice cream, effective 2015 (Stewart 2013).

Consumer Survey

Research Questions. The divergence between the FDA's action, or lack of action in defining "natural" and on whether there should be mandatory labeling of GMOs, the conclusion of the FTC that "natural" could not be defined because it is based on the context in which the claim is made, the variance in state actions regarding mandatory labeling, and the consumers apparent strong preference that foods labeled "natural" not contain artificial ingredients, which, in their mind, includes GMOs, raises four questions. First, how do consumers interpret "all natural" when they see it on consumer products? Second, do consumers consider GMOs to be natural (as the FDA asserts) or as artificial ingredients (which is the basis for state statutes such as the Connecticut statute)? Third, is there a difference in perception of a consumer product when it has an express "all natural" claim on the label and when there are other nutrition-related claims on the label but no express "all natural" claim? Fourth, how would knowledge that products they buy that are labeled "natural" but contain unlabeled GMOs impact consumers' decision to purchase those products if they knew they contained GMOs?

In order to answer these questions, a nationwide on-line consumer study with four separate samples was undertaken. Study 1 asked consumers who purchase "natural" products at least occasionally what their understanding of the phrase "all natural" means. Thus, Study 1 askes about the meaning of "all natural" in a context-free format, i.e., there is no reference to any particular product. Respondents in the other three studies (i.e., Study 2, Study 3, and Study 4) were screened to identify individuals who had purchased a particular brand of granola or fiber bar. Study 2 asked consumers who have purchase a particular brand of granola or fiber bars their reasons for purchase and the possible impact of the company adding GMOs to the product on their likelihood of purchasing the product. Thus, respondents in Study 2 are responding relative to a particular product category (granola bars) but independent of any specific claim that a marketer may have made about its product. Respondents in Study 3 (Test Condition) were shown the label of the particular brand of granola bar and assessed their perception of the label, which includes an express "all natural" claim on the label. Respondents in Study 4 (Control Condition) were shown the label for the same brand of granola bar, only without the express "all natural" claim on the label.

The particular brand of granola bar was selected because it contained unlabeled GMOs. Thus, Study 3 and Study 4 assesses consumer perceptions in a particular product and claim in a brand-specific context, i.e., on the basis of express or implied claims made of a label.

Methodology

Research Design. The sample for the four studies was drawn from a nationwide commercial internet panel of respondents 18 years of age or older. The panel selected has over three million individuals who have agreed to participate in on-line surveys on a periodic basis.

Panel members where contacted by email and asked to participate in an on-line survey by clicking on the link to the survey. There was no mention of the topic of the survey in the email. Respondents who clicked on the link to the survey were first screened to determine that they buy "all natural" products including granola or fiber bars. Respondents where then randomly assigned to either Study 1 or to an introduction to Study 2-3-4 where they were asked about products they buy. Respondents randomly assigned to Study 1 were then asked how often they eat products labeled "all natural" and their understanding of the "all natural' claim. As described above, only respondents who buy the particular brand of granola bar were qualified for random assignment to either Study 2 (perception of Brand C granola bar), Study 3 (Test Condition where they saw a Brand C granola bar with an "all-natural" claim on the label), or Study 4 (Control Condition where they saw a Brand C granola bar with no "all natural" claim on the label). As noted in Table 1, two-thirds of the respondents (65.8%) had eaten the particular brand of granola bar (Brand C) and were thus qualified for random assignment for Study 2, 3, or 4. Some of the brands included in the question (in alphabetical order) were: Kashi, Nature Valley, Nature's Path, and Special K. between 150 and 200 respondents were randomly assigned to each of the four studies.

Table 1: Brand of Granola Fiber Bar Eat

	Study 2,3,4
Brand A	484 (60.5%)
Brand B	143 (18.2%)
Brand C	**526 (65.8%)**
Brand D	308 (38.5%)
Brand E	189 (23.6%)
None of the Above	46 (5.8%)
Other	121 (15.1%)
Don't know/Not sure	24 (3.0%)

*Multiple responses accepted. **Order of responses randomized.

Demographic Profile of Respondents. Between two-thirds and seventy percent of internet panel respondents across the four studies were female. Additionally, the majority of respondents in all four samples were between age 36-65, with almost half of all respondents having a 4-Yr college degree or graduate school/degree. There were no significant differences in respondent profiles across the four studies.

Findings

Study 1

Study 1 sought to determine consumers' perception of the phrase "all natural" independent of any product or brand. Study 1, therefore, serves as a base-line level of perception of the phrase "all natural" when used relative to food products. Respondents randomly assigned to Study 1 were first asked how often they buy products labeled "all natural." Eighty three percent of the respondents indicated they buy products labeled "all natural" at least occasionally. These respondents were then asked "When you see a product labeled 'all natural,' what does it say or suggest to you?" with their verbatim responses recorded. As noted in Table 2, almost two-thirds of respondents (60.8%) believe a product labeled "all natural" is one that has "no artificial ingredients or preservatives," including a small percent (1.5%) who specifically said a product labeled "all natural" does not have GMOs.

Table 2: Meaning of "All Natural" [Verbatim Responses]

Natural/organic	18 (9.0%)	12.5%
Pure/Natural ingredients	7 (3.5%)	
Healthy/Better for me	17 (8.5%)	
No artificial ingredients/additives	**85 (42.7%)**	
No preservatives	**33 (16.6%)**	**60.8%**
No GMOs	**3 (1.5%)**	
Nothing	16 (8.0%)	
Don't know/Not sure	4 (2.0%)	
Miscellaneous	16 (16.0%)	
TOTAL	199	

Respondents in Study 1 were then presented a list of options and asked which, if any, are suggested by a label that says "all natural." As noted in Table 3, almost all respondents (84%) believe a product labeled "all natural" does not contain have artificial ingredients, while over half believe, when asked with closed-end responses that includes a no-GMO's option, believe an "all natural" product is one that does not have preservatives (67%) or have GMOs (54%).

Table 3: Meaning of "All Natural"

No artificial ingredients*	168 (84%)**
No preservatives	134 (67%)
No GMOs	107 (54%)
Minimally processed	97 (49%)
Tested by the FDA/Government	20 (10%)
Organic	64 (32%)
Guaranteed to taste better	16 (8%)
Don't know/Not sure	6 (3%)
None of the above	7 (3%)
TOTAL	199

*Order of response options randomized; ** Multiple responses accepted

Study 2

Reason for Eating Brand C Granola Bars. Respondents randomly assigned to Study 2 were not shown any package. They were asked in a closed-end question format, what were their reasons for eating Brand C granola bars and the likely impact on their purchase behavior in Brand C added GMOs to the product. As noted in Table 4, half of the respondents (52%) said their reason for buying Brand C granola bars is because it is seen as "all natural," with a similar percentage (49%) buying them because it has "simple ingredients" or simply because the bars are "good nutrition."

Also noteworthy in Table 4 is that, among respondents who said their reason was that Brand C was "all natural" (column 1),72% said (column 2) that their reason for purchasing that particular brand was because it is "made with simple ingredients" and, consistent with the results in Study 1 where 60.8% of respondents said "all natural" products said or implied the products had no artificial ingredients or preservatives (Table 3 above), 61% of the respondents in Study 2 also said they bought Brand C because it was all natural and had no artificial ingredients.

Table 4: Reasons for Eating Brand C Granola or Fiber Bars

	Study 2 Respondents	**"All Natural" Respondents*** **
They're all natural**	108 (52%)*	108
They're made with simple ingredients	102 (49%)	78 (72%)
They have no preservatives	76 (37%)	63 (58%)
They're lower priced	24 (12%)	19 (19%)
They have no Genetically Modified Ingredients (GMO's)	49 (24%)	41 (38%)
They have no artificial ingredients	80 (39%)	66 (61%)
They're good nutrition	103 (50%)	78 (72%)
They're healthier than other brands	88 (43%)	65 (60%)
None of the above	55 (27%)	
Other	8 (4%)	2 (2%)

*Multiple responses accepted. **Order of responses randomized.
***Limited to respondents who said "all natural" in column 1

Impact of Decision to Include GMOs in Brand C Granola Bars. As noted in the methodology, respondents in Study 2 were asked, hypothetically, how likely they would be to buy Brand C granola bars if the bars contained GMOs. As noted in Table 5, there is no significant difference (α = ns) in likelihood of buying Brand C if it contained GMOs between the total sample of respondents' reason for eating Brand C granola bar and those whose reason is their perception that the brand is "all natural." Specifically, 42% of all respondents in Study 2and 47% of those who buy the granola bar because it is "all natural" would be "less likely" to buy a Brand C granola or fiber bar if it contained GMOs. Similarly, between 13% and 19% of respondents would be "more likely" to purchase the product if the company added GMOs to their nutrition bars and, for approximately one-third of respondents, adding GMOs wouldn't make a difference.

Table 5: Likelihood of Buying Brand C If GMOs Added

	Study 2 Respondents		**"All Natural" Respondents****	
Much less likely to buy	64 (31%)		35 (32%)	
Less likely to buy	22 (11%)	42%	16 (15%)	47%*
About the same/Wouldn't make a difference	68 (33%)		33 (31%)	
More likely to buy	11 (5%)	13%	7 (6%)	19%
Much more likely to buy	16 (8%)		14 (13%)	
Don't know/Not sure	26 (13%)		3 (3%)	
TOTAL	207		108	

*α=ns; **Limited to those who said "All Natural" in Table 4

Those respondents who said they were "much less likely" or "less likely" to buy Brand C granola or fiber bars if the company added GMOs (column 1, n=86) were asked why they felt that way, with their verbatim responses recorded. As noted in Table 6, the most frequently mentioned reason (55% of responses) is because they "don't want GMOs" or because they "don't approve of GMOs" while 21% said it was because they believe GMOs are "unhealthy" or "bad for you" or because they are "not natural" (16%).

Table 6: Reason for Buying Less Brand C Granola Bars if Contained GMO's [Verbatim Responses]

Don't Want GMO's/Don't Approve GMO's	47 (55%)
GMO's are unhealthy/bad for you	18 (21%)
Not natural/have preservatives	14 (16%)
Contrary to Kashi image	3 (4%)
Miscellaneous	2 (2%)
Don't know/Not sure	2 (2%)
TOTAL	86*

*Limited to those who said "much less" or "less likely" to buy

Respondents who said they were "more likely" or "much more likely" to buy Brand C if the company added GMOs to their granola bars (n=27) were asked their reason. The most frequently mentioned reason why they would continue buying Brand C if GMOs were added is because they perceive Brand C granola bars as "healthy" and "good for you," or because they "liked or trust the brand" or they "liked the taste."

Study 3(Test) & Study 4 (Control)

Stimuli. As described in the methodology, respondents randomly assigned to Study 3 (Test Condition) and Study 4 (Control Condition) were shown the front and back label of a Brand C granola bar. The label in Study 3 (Test Condition) included express "all natural" claim on the front panel whereas the label in Study 4 (Control Condition) did not contain any "all natural" claim but retained all the other nutrition-related claims found on the Study 3 label. The back panels in both conditions were identical and did not contain any "all natural" references.

Findings**.** Respondents in both the test and control conditions were first asked what the label said or suggested about the granola bar, with their verbatim responses recorded. As noted in Table 7, there was no significant differences in perception of Brand C between the test condition (with the "all natural" claim on the label) and the control condition (without the "all natural" claim on the label), with a slightly higher percentage (34.2%) in the control condition saying it said or suggested "all natural" or "all natural ingredients, compared to 30.1% in the test condition.

Table 7: What Brand C Label Says/Suggests [Verbatim Responses]

	Study 3 -Test		**Study 4 -Control**	
Natural, All Natural	41 (26.1%)	30.1%*	36 (17.1%)	34.2%*
Natural/Healthy Ingredients	22 (14.0%)		36 (17.1%)	
No High Fructose Corn Syrup	43 (27.4%)		26 (12.3%)	
Ingredients (general)	24 (15.3%)		39 (18.5%)	
Good/Healthy for you	20 (13.4%)		44 (20.9%)	
Miscellaneous/Don't Know	7 (4.5%)		30 (14.2%)	
TOTAL	157		211	

*α=ns

Respondents in both the test and control conditions were then asked whether the label said or suggested anything about the Brand C granola bar being "all natural." Sixty-eight percent respondents in the test condition (Study 3) indicated that the label said or suggested something about the product being "all natural," while a significantly higher percentage (79%, α=.05) of respondents in the control condition (Study 4) indicated the label suggested something about the product being "all natural," even though there was no express claim of "all natural" on the label. This suggests a pre-existing belief that granola bars in general or Brand C granola bars in particular are made with "all natural" ingredients.

In order to probe more deeply into consumers' perceptions, all respondents in Study 3 and Study 4 were then asked their understanding of characteristics of an "all natural" Brand C granola bar. As noted in Table 8 and consistent with Study 1 (Table 3), there are no significant differences in perception of Brand C granola bar as being "all natural" with or without the "all natural" claim on the label. Specifically, 81% of respondents in the test condition (with "all natural" on the label) and 82% of respondents in the control condition (without "all natural" on the label) said an "all natural" Brand C granola bar has "no artificial ingredients," or "no preservatives" and over half of the respondents in both the test and control conditions said an "all natural" granola bar did not have GMOs, suggesting a strong association between an "all natural" claim and lack of GMOs, regardless of whether the "all natural" claim is expressed on or implied on the label.

Table 8: Characteristics of an "All natural" Brand C Granola Bar

	Study 3 Test	**Study 4 Control**
They're made with simple ingredients	116 (59%)	145 (69%)
They have no preservatives	127 (64%)	150 (71%)
They have no Genetically Modified Ingredients (GMOs)	110 (56%)	138 (66%)
They have no artificial ingredients	159 (81%)	172 (82%)
They're good nutrition	117 (59%)	150 (71%)
They're healthier than other brands	99 (50%)	136 (65%)
They're lower priced	3 (2%)	12 (6%)
Don't know/Not sure/Other	18 (10%)	7 (3%)
TOTAL	197	210

*Multiple responses accepted. **Order of responses randomized.

Impact of Decision to Include GMOs in Brand C Granola Bars. Respondents in Study 3 and Study 4, like those in Study 2, were asked how likely they would be to buy Brand C granola or fiber bars if the bars contained GMOs. As noted in Table 9, there are no significant differences between respondents in the test and control conditions in likelihood of buying Brand C granola bars if GMOs are added. Specifically, over half of the respondents in both the test (Study 3) and the control (Study 4) would be "less likely" to buy a Brand C granola bar if it contained GMOs while between 18% and 22% across the two conditions would be "more likely" or "much more likely" to purchase the product if the company added GMOs to their nutrition bars.

Table 9: Likelihood of Buying Brand C If GMOs Added

	Study 3 Test	**Study 4 Control**
Much less likely to buy	32 (29%) 54%*	46 (33%) 58%*
Less likely to buy	27 (25%)	34 (25%)
About the same/Wouldn't make a difference	28 (25%)	20 (14%)
More likely to buy	6 (5%) 18%	11 (8%) 22%
Much more likely to buy	14 (13%)	19 (14%)
Don't know/Not sure	3 (3%)	8 (6%)
TOTAL	110	138

**Limited to those who said "All Natural" in Table 5; α=ns.

Conclusions

Four conclusions flow from these findings. First, consumers believe that products labeled as "all natural" are ones without artificial ingredients or preservatives and are, therefore, healthier and better for them. Second, this perception is consistent in that it is found whether associated with a particular brand of product or not and whether it is an expressed claim made on the label or implied by other claims on the label. Third, while consumers don't necessarily associate "all natural" with "no GMOs," when asked specifically about a relationship between "all natural" and GMOs, consumers see GMOs as being artificial ingredients and, therefore, "not all natural." Fourth, if consumers learn that the brand of products they buy contains GMOs, almost half of the respondents who did not see a product label (i.e., 42% -- Study 2) and over half of respondents who did see a product label, either with the express "all natural" claim (Study 3) or implied from other claims on the label (Study 4), would be less likely to buy that brand, suggesting a pre-existing perception of GMOs as something "artificial" and, therefore, not natural.

Policy Implications

There are three policy implications from these findings. First, contrary to the FTC's rational for not defining "natural," i.e., because claims must be examined in terms of the specific context in which they are made, consumers' perception of "all natural" products as having no artificial ingredients holds true regardless of the context, i.e., when asked independent of any product, when thinking about a specific product (here granola bars) but outside of the context of a label, and after seeing "all natural" on a label of a particular brand of granola bar.

Second, while "no GMOs" is not the first thing consumers think of when asked about the meaning of "all natural," consumers believe that a product labeled as "all natural" should not contain artificial ingredients, which the perceive GMOs as being. Thus, in spite of empirical evidence of no health or environmental risk associated with GMOs (National Academy of Science report) and contrary to the FDA's perspective that products containing GMOs do not need to be labeled, consumers believe that products labeled as "all natural" are healthier and better for them and that GMOs, because they are seen as artificial ingredients, are not healthy or better for them.

These first two implications lead to the third, namely that the FDA needs to provide a specific definition as to what is a "natural" or "all natural" food product, rather than simply promulgate non-binding guidelines. Given the growing number of state actions where GMO labeling statutes were proposed but failed, e.g., California, Washington, Oregon, and where they have succeeded, e.g., Connecticut, Maine, and Vermont, failure of the FDA to act will lead to a "patchwork" of GMO labeling statutes which, assuming they withstand Constitutional challenges, will make marketing consumer products across states more complex for food processors and consumers.

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