

Consumer Response to Media Information: The Case of Grapefruit-Drug Interaction

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Selected Poster prepared for presentation at the Agricultural & Applied Economics Association's 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014.

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Introduction and Background

On November 26 and 27, 2012, major news channels featured stories about the effect of grapefruit-drug interactions. They cited a 2013 study by Bailey, Dresser and Arnold (2013) that found more than 85 drugs have the possibility of interacting with grapefruit. Of these drugs, 43 have interactions that can result in serious adverse effects.



Drinking grapefruit juice with some medications can be deadly, study warns



Not a Brand New Finding

Bailey et al. initially discovered potential grapefruit-drug interaction in 1991. As many other scientists have studied this topic, the list of medications with grapefruit interactions has grown (Kupferschmidt et al., 1995; Lilja, Kivistö and Neuvonen, 1998; Zhang and Brodbelt, 2004; Kivistö et al., 1999; Kurata et al., 2012; Monroe et al., 2013).

Special Attention to GF-Drug Interactions

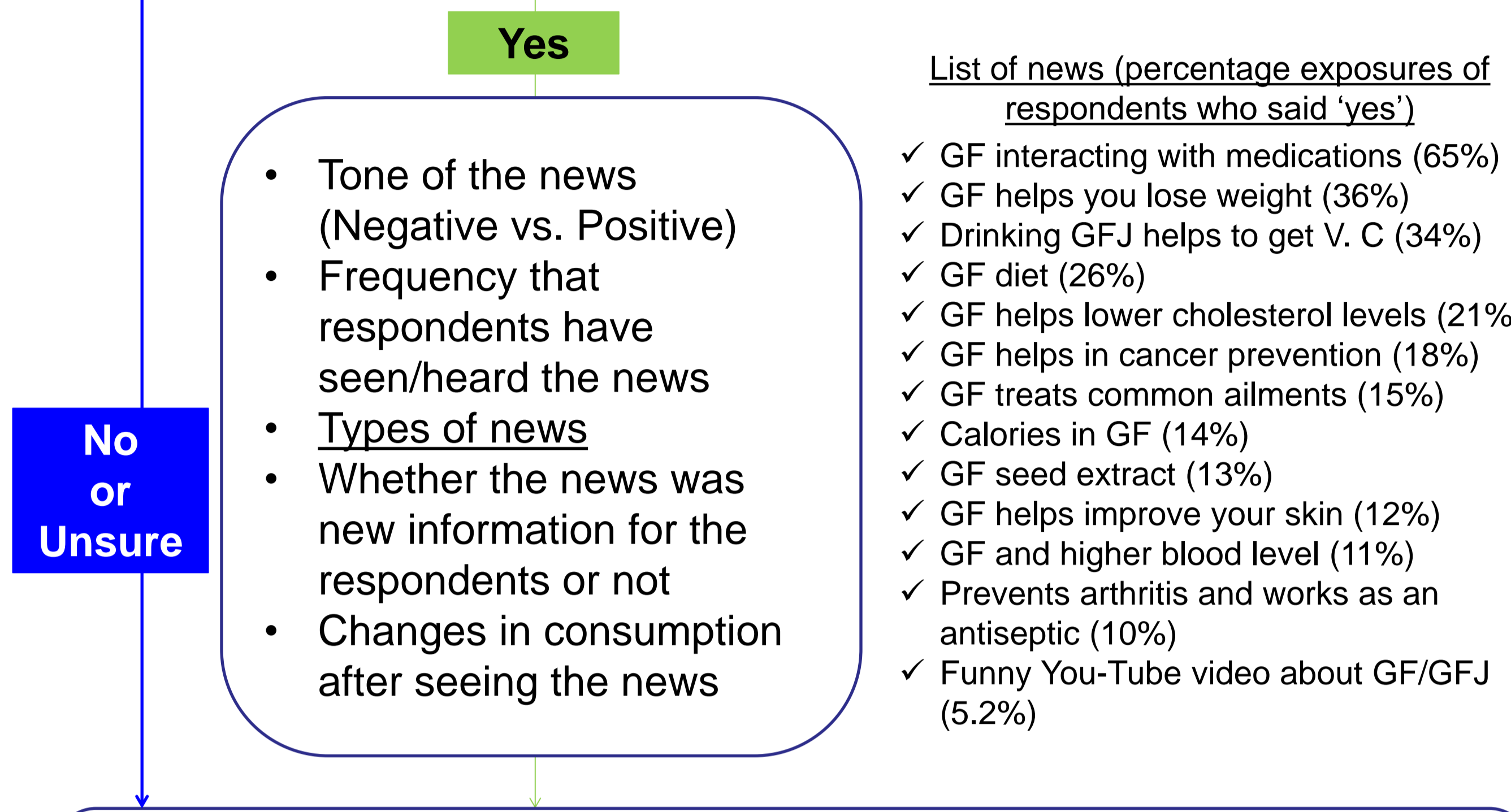
Comparing the demographics of typical grapefruit consumers and medications that interact tend to identify the same people (Baldwin and Jones, 2013). Of adults aged 60 and over, approximately 45% indicated that they took cholesterol lowering drugs, and 20% and 26% indicated they took Diuretics and β -blockers that are medication related to high blood pressure and heart disease, respectively (Gu, Dillon and Burt, 2010). These are generally on the list of medications with grapefruit interactions.

Role of Media in Consumer Behavior

Many study found that consumer attitudes, opinions and choice are influenced by information on media (Piggott and Marsh, 2004; Dillaway et. al 2011; Brown and Schrader 1990; Adhikari et. al 2006; Kalaitzandonakes, Marks and Vickner, 2004)

Consumer Survey Design

- Have you seen, read or heard news about grapefruit or grapefruit juice in the last month?
- Respondents' attitude toward health news



- List of news (percentage exposures of respondents who said 'yes')
- ✓ GF interacting with medications (65%)
 - ✓ GF helps you lose weight (36%)
 - ✓ Drinking GFJ helps to get V. C (34%)
 - ✓ GF diet (26%)
 - ✓ GF helps lower cholesterol levels (21%)
 - ✓ GF helps in cancer prevention (18%)
 - ✓ GF treats common ailments (15%)
 - ✓ Calories in GF (14%)
 - ✓ GF seed extract (13%)
 - ✓ GF helps improve your skin (12%)
 - ✓ GF and higher blood level (11%)
 - ✓ Prevents arthritis and works as an antiseptic (10%)
 - ✓ Funny You-Tube video about GF/GFJ (5.2%)

Data Collection

Online survey: 12/10~12/17/12 (almost two weeks after the news was released)
Valid sample: 3,505 (age 18 and over)

Variable	Description	Sample (%)	U.S. Census (%)
Gender	=1 if male	45.0	48.5
Age	=1 if <40 =2 if 40-60 =3 if 60+	37.3 40.8 22.0	36.7 37.9 25.3
Education	=1 if less than high school =2 if high school and some college =3 if college and more	2.6 63.0 34.4	12.9 57.2 29.9
Household income	=1 Under \$25,000 =2 \$25,000 to \$49,999 =3 \$50,000 to \$74,999 =4 \$75,000 or more	28.1 32.0 19.4 20.6	25.7 24.7 17.7 31.9
Media expose	=1 if respondents have exposed to GF/GFJ news over the past month	15.8	NA
Consumption changes	=1 if consumed less =2 if no changes =3 if consumed more	10.8 72.8 16.4	NA
Prescription	=1 if respondents take any prescription medications	57.8	57.6*
Warning	=1 if the medication come with warnings about GF/GFJ	14.7	NA
Positive tone	=1 if respondents recalled the news was positive	5.6	NA
Negative tone	=1 if respondents recalled the news was negative	4.3	NA
Positive freq.	Mean=1.5 (Frequency 0 to 8)		NA
Negative freq.	Mean=1.4 (Frequency 0 to 8)		NA
Old news	=1 if respondents already knew the interaction	5.2	NA
New news	=1 if the interaction news is new	3.9	NA
Trust	=1 if respondents agree with reliability of health news	55.5	NA
Influence	=1 if respondents agree with impact of health news on their behavior	49.2	NA
Search	=1 if respondents agree with the statement searching for further information	60.4	NA

* Percentage of use at least one prescription drug is 48.3% age between 20 and 59, and 88.4% age 60 and over from the data of NHNES 2007-08, CDC/NCHS. Using 2007 population by age, we calculated the number of people who took prescription medication associated with the age groups.

Estimated Results of Ordered Response Model with Sample Selection (De Luca and Perotti, 2010)

Selection equation	Age<40	Age≥40	Outcome equation	Age<40	Age≥40
Intercept	-2.285**	-1.896**	Thresholds 1	-0.796	-1.251
Gender	0.297**	-0.158**	Thresholds 2	1.936	2.333**
Income	0.063	0.000	Gender	0.242	-0.037
Education	0.046	0.172**	Income	-0.134	0.022
Prescription	0.097	0.055	Education	0.256	0.078
Warning	0.676**	0.459**	Prescription	0.136	-0.179
GF consumers	0.636**	0.26**	Warning	0.186	-0.687
Trust	0.047	0.001	Low consumption	0.538	-0.417
Influence	0.185	0.173**	High consumption	0.869	0.493**
Search	0.366**	0.229**	Positive tone	0.774**	0.977**
			Negative tone	-0.445	-0.230
ρ	-0.037	0.445	Positive freq.	0.050	0.056
LRtest ($H_0: \rho=0, \chi^2(1)$)	115.46**	155.82**	Negative freq.	-0.037	-0.007
Log Likelihood	-671	-1043	Old news	-0.329	-0.604**
Observations	1304	2194	New news	-0.235	-0.859**

** indicates that estimated parameters are significantly different from zero at 5% levels.

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Probabilities of the possible outcomes

Predicted Probability	Age<40	Age≥40
P(no exposure to GF/GFJ news)	0.750	0.840
P(exposure to GF/GFJ news, consume less)	0.005	0.009
P(exposure to GF/GFJ news, no changes)	0.184	0.150
P(exposure to GF/GFJ news, consume more)	0.060	0.002

Purpose of Study

To measure the effect of media exposure on grapefruit/grapefruit juice consumption using a sample selection model

1. Identify exposure rate to news about grapefruit
2. Identify characteristics of respondents who are more exposed to grapefruit news
3. Determine the effect of news media on consumer purchases of grapefruit/grapefruit juice by subject age, subjects who initially exposed to the news or not, tone of news, frequency of exposure to news

Exposure Rate

Traditional measurement (frequency of hits and quantity to exposure) may not be representative due to the changed environment (increasing availability of portable devices, information sources and duplication).

Tone of the ads do impact those watching, as shown in a study on voter turnout (Freedman and Goldstein, 1999).

Respondents' attitude toward health news (survey questions used)

1. Reliability of health news
I trust health information I hear on TV news or read on internet news
2. Impact of health news on respondents' behavior
Health information from TV or internet news influences my consumption behavior
3. Initiative in searching for further information
If I hear health information from TV or internet news, I usually search for more information

Findings

- 16% of participants had seen, read, or heard some news about GF or GFJ in the last month
- Exposure rates were relatively high in consumers aged less than 40
- The probability of respondents who decreased their consumption due to news about GF/GFJ was high in consumers aged 40 and over
- Response attitudes toward health information on TV and the internet significantly explained media exposure to GF and GFJ news
- The more aggressive to health news on TV and the internet, the more exposed
- Consumers strongly reacted to information when the news directly related to their health
- Grapefruit consumers (aged 40 and over) and respondents who took prescription medication which interacts with grapefruit were more likely to be exposed to the news
- The interaction effect was only significant in consumers aged 40 and over
- Young people are less sensitive to the news
- Repeated media hits influenced consumption changes
- Both consumers who already knew the news and who initially heard the news were more likely to indicate their GF/GFJ consumption decreased
- Tone of information is more important than frequency
- Positive information offset negative information
- Frequent consumers were more likely to increase consumption of grapefruit/grapefruit juice
- These consumers may well recognize the effect and may know how they can handle the problem. Therefore, the information does not seem to bother these consumers.
- Providing correct information about the effect will help to reduce fear among potential consumers who are not willing to consume grapefruit/grapefruit juice due to implicit information