<table>
<thead>
<tr>
<th>Title</th>
<th>Exploring the Impacts of Food Technology Beliefs, Evaluations, and Media Consumption on Attitudes Toward Nanofood in Singapore (Nanofood attitude in Singapore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Kong, Wei Yi; Chen, Xiaoyu; Bañas Alvarez, Katrina; Ho, Shirley S.; Cummings, Christopher</td>
</tr>
<tr>
<td>Date</td>
<td>2017</td>
</tr>
<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10220/44325">http://hdl.handle.net/10220/44325</a></td>
</tr>
<tr>
<td>Rights</td>
<td>© 2017 Global Science and Technology Forum (GSTF). This is an open access paper published under a Creative Commons Attribution NonCommercial (CC-BY-NC 3.0) license that allows reuse subject only to the use being non-commercial and to the article being fully attributed (<a href="http://creativecommons.org/licenses/by-nc/3.0">http://creativecommons.org/licenses/by-nc/3.0</a>) to GSTF.</td>
</tr>
</tbody>
</table>
Exploring the Impacts of Food Technology Beliefs, Evaluations, and Media Consumption on Attitudes Toward Nanofood in Singapore

Abstract—This paper aims to explore factors influencing people’s attitudes toward nanofood in Singapore. Drawing on expectancy-value theories, this paper conducted a web-based survey (N=1,001) to measure the influences of beliefs of food technology, evaluations of food naturalness, and media consumption about food safety on attitudes toward nanofood and willingness to purchase nanofood products. Results suggested that attitudes toward nanofood are directly shaped by beliefs of food technology, whose influence is partially mediated by media consumption. Attitudes toward nanofood were also positively related to willingness to purchase nanofood. However, our study found no significant effect of food naturalness evaluations on attitudes toward nanofood. This paper helps to elucidate the significance of favorable perceptions of food technology and informative media messages in encouraging positive attitudes toward nanofood.

Keywords—Nanofood attitudes; expectancy-value; food technology; media consumption

I. INTRODUCTION

Humans have been consuming nanomaterials and nanoparticles—as small as one billionth of a meter—for decades [1]. As the properties and structure of many naturally available foods can be controlled at the nanoscale [2], nanotechnology researchers are interested in engineering food at this level in order to make healthier food products (e.g., products that would deliver food ingredients in the body more efficiently) [3]. However, recent studies have shown that most people are unfamiliar with nanofood [2–4]. For example, Europeans have expressed reluctance to accept nanotechnology in food and food packaging [5], and the genetically modified food debate in that region suggests that ignoring the public’s health and environmental concerns might negatively influence their acceptance of new food technology [6]. Asian governments may also fail to account for public concerns as citizens may be less able to voice their opinions on food technologies that may affect them [7]. It is important to educate the public on the benefits of nanofood and to understand their corresponding attitudes, as nanotechnology continues to thrive in the food industry.

Prior research examined people’s attitudes toward nanofood from a benefit-risk perspective [3, 8]. Yet, some scholars found that public attitudes toward unfamiliar science issues cannot be explained solely by assessments of benefits and risks [9]. In efforts to reconcile attitude formations, seeking a better understanding of the impact of general attitudes toward science and food technology would shed more light on public attitudes toward nanofood [10]. Further, the role of media consumption in such assessments has received little attention. The influence of media consumption is important in understanding attitudes toward nanofood, as people are unfamiliar with nanofood and may recourse to borrowing information from their understanding of science in general and relying on heuristics provided by mass media [11]—that often discuss the general issue of nanotechnology in terms of economic benefits and scientific merits [12, 13]—when forming opinions of nanofood products.

To address the aforementioned research gaps, we drew on the EVT to explore direct and indirect relationships between individuals’ (1) attitudes toward science in general and food technology in particular, and (2) attitudes toward nanofood. Additionally, this study contributes to literature on nanofood by exploring the role of media consumption in public attitudes.

II. LITERATURE REVIEW

A. Nanofood and Public Attitudes

Central to nanofood is the use of nanotechnology, which involves the creation and control of materials containing particles that are 1–100 nanometers in size [14]. Nanotechnology products exhibit significantly enhanced performance and functions [15]. Nanotechnology has been widely applied to improve medicine, water treatment, biochemistry, construction materials, and food processing [16]. In the food industry, nanotechnology can affect the quality of food products in terms of their safety, shelf life, packaging, and nutritional value [15, 17]. Nanofoods are food products prepared using nanotechnology and which contain an acceptable level of nanomaterials [18].

More nanofood products are entering the food chain [19], yet there is also growing concern regarding the potential health risks arising from nanoparticles. Nanofoods have higher bioavailabilities [1], meaning particles at the nanoscale are able to penetrate the natural barriers in the human body and enter the circulatory system [20], as a result of direct ingestion or indirect contact with nanomaterials in food packaging [14]. This could result in an accumulation of harmful contaminants in the human body over time and adversely affect human health [21]. Such unintended negative effects could hinder public acceptance of nanotechnology despite its potential [8]. The degree of public acceptance could, in turn, determine the pace of nanotechnology advancement and commercial applications [22].

Public attitudes toward nanofood are fueled by the perceived benefits and naturalness of nanofood [23]. People
who perceived more rather than fewer benefits of nanotechnology associated it with lower risks and expressed higher acceptance [3, 8, 24, 25]. However, people ascribe higher utility to natural food than to nanofood, and this suggests that perceived benefits may not sufficiently motivate purchases; food naturalness may serve as an additional consideration in consumers’ willingness to accept and purchase nanofood products [8]. People have also been found to perceive higher levels of risks associated with nanotechnology than do experts [24, 25]. This discrepancy may be due to a lack of expert knowledge and conscious experience with nanotechnology [26], and even arguably nanofood. Thus, people gather information through the mass media to acquaint themselves with unfamiliar issues [27], which implies that the media may have substantial influence on nanofood attitudes. The following segments of the paper introduce expectancy-value theories (EVTs) and apply media consumption as a source of knowledge that may shape public attitudes toward nanofood.

B. Expectancy-Value Theories (EVTs) and Attitudes

Early behavioral psychologists devised EVT to explain organisms’ intentions and actions. Reference [28] was one of the first studies positing that an organism’s behavior is influenced by a “belief-expectancy system” and a “drive-incentive-value system” [28: p. 316]. The first system features expectancy—expectations of or beliefs in certain outcomes from given stimuli. The second concerns value, which depends on the organisms’ inclinations toward a positive stimulus or aversion to a negative one, under the influence of a drive, such as hunger or fear. Describing how animals in mazes chose paths toward either food or water, or whether they are willing to work for food by pressing levers, [28] suggested their behavior would be a function of these two systems together.

Later scholarship expanded on such work by applying it to human attitudes and behavior. [29] and [30] both saw attitudes, or a person’s dispositions to respond favorably or unfavorably to something, as functions of expectancy and value. For [29], attitudes depended on an individual’s “beliefs about the object (i.e., the probability that the object is associated with other objects, concepts, values, or goals) and the evaluative aspect of those beliefs” [29: p. 233]. Reference [30] similarly saw attitudes as made up of “beliefs that link [an object] with certain characteristics or attributes” and “evaluations of, and feelings toward, the attitude object” [30: p. 4]. Attempts to change an attitude will require an understanding of the underlying elements of which an attitude is composed of [31].

Beliefs about a technology can influence consumer acceptance—a positive attitude—of the said technology [4]. This suggests that positive beliefs about science and food technology in general might be associated with positive attitudes toward nanofood in particular. Moreover, consumers tend to have negative evaluations, such as unease and uncertainty, for food-related technologies in general (e.g., [32, 33, 34, 35]). These evaluations can be seen as the perceived value of some specific outcome that may affect the individual’s subsequent behavioral intention [36]. Prior research on evaluations of nanotechnology suggested that respondents ascribed more risk to food applications than to others such as medical and electronic uses [8, 37]. In this case, we argue that individual preference for natural food has been associated with higher evaluations of uncertainty and negative feelings with nanofood products that can negatively affect their attitudes toward nanofood. We thus formulated the following hypotheses:

H1a: Strong beliefs of science and food technology are positively related to attitudes toward nanofood.

H1b: High evaluations of food naturalness are negatively related to attitudes toward nanofood.

C. EVT with Media Consumption

While EVT has been used to explain various attitudes and behaviors, [38] and [39] aimed to integrate uses and gratifications theory [40] to explain audiences’ choices of media for consumption. The uses and gratifications approach assumes that audiences are active consumers who select media based on its capacity to meet certain needs. [38] suggested that audiences have beliefs about which forms of media consumption provide which outcomes. They also have evaluations about those various outcomes. [38] thus predicted that beliefs and evaluations regarding the outcomes of media consumption would be positively related to that consumption.

Research on selective news exposure suggests people prefer to consume media content that is consistent with their beliefs and values. This helps them to defend their attitudes and behaviors by seeking supportive information and avoiding challenging or contradictory information [41]. Interpreted under EVT [38], selective exposure to media content is a function of people’s beliefs and evaluations about the outcome of confirming their own attitudes. There is little science communication research that tests this proposition, but in one recent experiment, participants learning about nanotechnology were more likely to choose news items from sources that shared their ideologies [42]. Thus, beyond the claim that interest in science and technology predicts consulting the media about it [43], it may be that people who have certain beliefs and evaluations about science and technology topics—in this case, food safety—will consume related media content, with the goal of confirming those beliefs and values. We thus formulated the following hypotheses:

H2a: Strong beliefs of science and food technology are positively related to media consumption on food safety.

H2b: High evaluations of food naturalness are positively related to media consumption on food safety.

Research on media influence also suggests a positive link between science-related media consumption and attitudes toward science and technology in general [44]. In one study, members of the general public relied more on the media to
form their attitudes more than scientists did [45]. Science media consumption has predicted respondents’ support for nanotechnology [10, 11], but also for the regulation of commercial nanotechnology research [45]. Because nanofood products would result from such research, we were interested in how science media consumption, if predicted by expectancies and values, might influence people’s attitudes. We expressed this as the following research question:

RQ1: Does media consumption mediate the relationship between beliefs of science and food technology, evaluations of food naturalness, and attitudes toward nanofood?

[28] reasoned that beliefs and values could predict behavioral intentions and behaviors themselves, not simply attitudes. [30] proposed that attitudes could directly predict behavioral intentions. Previous research has shown a relationship between attitudes and willingness to buy nanofood products [46], and intentions to make such purchases [47]. We examine whether attitudes in our study would similarly relate to such intentions by testing the following hypotheses:

H3: Favorable attitudes toward nanofood are positively related to willingness to purchase nanofood products.

Together, the proposed hypotheses and research question are illustrated in Fig. 1.

Fig. 1 Proposed conceptual model

III. METHOD

A. Design

Data were gathered through the online survey platform Qualtrics, where participants (N = 1,001) were asked to complete the questionnaire in three parts. First, they answered items on beliefs of science and food technology, evaluations of food naturalness, and food-safety-related media consumption patterns. Second, they viewed a mock cereal box that contained general information on nanotechnology in food as well as its risks and benefits. Finally, participants completed items measuring their attitudes toward nanofood and willingness to purchase nanofood products.

B. Sample

The respondent pool was composed of Singapore citizens and permanent residents, with a representative sampling of the country’s demographics. Ages ranged from 21 to 64 (M = 37.95, SD = 10.67), 51.6% were female, the median education level was “degree”, and the median monthly household income range was S$6,000 to S$6,900. The response rate achieved was 30.8%, calculated by dividing number of completed questionnaires with the total number of panelists invited. Respondents who completed the survey were given Qualtrics points that can be used to redeem prizes or products.

C. Measures

A battery of items measuring the independent and dependent variables were referenced from prior studies that sought to understand antecedents of public attitudes and behavioral intention regarding nanofood.

Beliefs of science and food technology. The construct was measured with an index of three items: “Technology should be used to increase food safety (e.g., shelf life)”, “Technology should be used to increase food quality (e.g., taste and color), and “We should use technology to improve our daily life”. Using a 7-point scale (1 = “Strongly disagree” and 7 = “Strongly agree”), a higher composite score indicated stronger beliefs of science and food technology (M = 5.26, SD = 1.09, Cronbach’s α = 0.80).

Evaluations of food naturalness. A composite index was formed with four items: “I prefer to buy natural products”, “To me the naturalness of the food that I buy is an important quality”, “I prefer to avoid food products with additives”, and “I do not mind paying a premium for natural products” that were measured on a 7-point scale (1 = “Strongly disagree” and 7 = “Strongly agree”), with higher mean scores indicating higher preference for natural products (M = 5.22, SD = 1.03, Cronbach’s α = 0.83).

Media consumption of food safety news. Respondents were asked to indicate the amount of attention (1 = “No attention at all” and 7 = “A lot of attention”) they paid to food safety issues on each of the following media: TV, print newspapers, online news, blogs, wikis, and social networking sites. These six items were averaged to create a composite index, with higher scores indicating more media consumption (M = 4.69, SD = 1.06, Cronbach’s α = 0.81).

Attitudes toward nanofood. The composite measure consisted of four items: “Nano ingredients in food are healthy”, “Nano ingredients in food are safe”, “I feel that nano ingredients in food products are risky” (reverse-coded), and “I feel that nano ingredients in food products are beneficial”. Measured on a 7-point scale (1 = “Strongly disagree” and 7 = “Strongly agree”), a higher composite score reflected more favorable attitudes toward nanofood (M = 3.85, SD = 0.98, Cronbach’s α = 0.84).

Willfulness to purchase nanofood. Respondents rated their level of willingness to purchase food products prepared using new technology on two statements: “I would be willing to buy food products with nano ingredients” and “I would pay more for food products with nano ingredients”. The items were measured on a 7-point scale (1 = “Strongly disagree” and 7 = “Strongly agree”; M = 3.85, SD = 1.20, r = 0.55).

Control variables. Demographic variables including age, gender, education level, ethnicity, religion and monthly household income were the control variables in this study.
**D. Data Analysis Method**

To test the hypotheses in this study, we conducted structural equation modeling (SEM). In comparison with traditional regression analyses, SEM has two main advantages. First, it is capable of analyzing latent variables with multiple items while recognizing measurement error. Second, it estimates the measurement model and structural model simultaneously and also assesses many stages of variables into one model [48].

In particular, partial least squares (PLS) was used to test the research model because, as a second-generation SEM technique, it informs the item loadings of each construct—thus assessing construct validity—and the causal relationships among constructs in multistage models [49]. Furthermore, relative to covariance-based SEM (i.e., AMOS, LISREL), PLS avoids restrictive distributional assumptions (e.g., normal distribution) as it uses the ordinary least squares regression and bootstrapping method [36].

SmartPLS 2.0 \(^1\) was employed to conduct PLS-SEM analyses due to its popularity in related behavioral research. Apart from this analytic tool, we also used SPSS to run the preliminary data analyses, as well as AMOS to test the research model fit.

**IV. RESULTS**

**A. Measurement Models**

**Goodness-of-fit.** A confirmatory factor analysis (CFA) was conducted to test the adequacy of the measurement model. CFA results revealed that factor loadings for all the constructs were larger than 0.5 (see Table I) and demonstrated a satisfactory model fit \((\chi^2/df = 2.905, \text{RMSEA} = 0.038, \text{GFI} = 0.93, \text{CFI} = 0.98, \text{NFI} = 0.97)\).

**Reliability and validity.** Reliability can be assessed by using Cronbach’s \(\alpha\), composite reliability (CR), and average variance extracted (AVE) [50]. In establishing benchmarks for reliability tests, [51] recommended a minimum Cronbach’s \(\alpha\) of 0.7, and [50] proposed the threshold values of 0.7 and 0.5 for CR and AVE, respectively. All constructs achieved scores higher than 0.7 in this study, indicating good convergent validity.

Discriminant validity was also assessed, where an acceptable discriminant score is determined when each construct’s square root of AVE is higher than all correlation scores. All constructs were shown to have a good discriminant validity, with the exception of the high correlation \((r = 0.85)\) between attitudes toward nanofood and purchase intention. Nonetheless, the variance inflation factors (VIF) for all constructs ranged between 1.24 and 1.37, which were lower than the most stringent threshold value of 3 [52].

**B. Structural Models**

Fig. 2 shows the results of our proposed model. H1a posited a positive relationship between food technology beliefs and attitudes toward nanofood. SEM results showed that beliefs of science and food technology \((\beta = 0.25)\) were significantly \((p < 0.01)\) and positively related to attitudes toward nanofood, hence H1a was supported. Conversely, H1b posited a negative relationship between food naturalness evaluations and attitudes toward nanofood, but results reflected a nonsignificant impact of such evaluations \((\beta = -0.06, \text{n.s.})\) on attitudes. Therefore, H1b was not supported.

The next set of hypotheses proposed positive associations between attitudes and food technology beliefs (H2a) or food naturalness evaluations (H2b). The analysis yielded significant, positive relationships for both beliefs \((\beta = 0.18)\) and evaluations \((\beta = 0.41)\) at the \(p < .01\) level, supporting both H2a and H2b. H3 was posited to understand the influence of attitudes toward nanofood on behavioral intention, and our results showed that attitudes were significantly related to willingness to purchase nanofood products \((\beta = 0.85)\) at the \(p < 0.01\) level. Therefore, H3 was also supported.

To address RQ1, a causal steps approach [53] that combines simple regression and multiple regression analyses was used to assess the mediation effect of media consumption.

---

\(^1\) https://www.smartpls.com/smartpls2, accessed in March 2017

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Item Coding</th>
<th>Item Descriptions</th>
<th>Factor Loadings</th>
<th>(\alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beliefs of science and food technology</td>
<td>BF1</td>
<td>Technology should be used to increase food safety.</td>
<td>0.89</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>BF2</td>
<td>Technology should be used to increase food quality.</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BF3</td>
<td>We should use technology to improve our daily life.</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Evaluation of food naturalness</td>
<td>EVA1</td>
<td>I prefer to buy natural products.</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EVA2</td>
<td>I rate the naturalness of the food that I buy as an important quality.</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>Media consumption</td>
<td>MC1</td>
<td>How much attention do you pay to news stories about food safety on TV?</td>
<td>0.66</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>MC2</td>
<td>How much attention do you pay to news stories about food safety on print newspapers?</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC3</td>
<td>How much attention do you pay to news stories about food safety on online news?</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC4</td>
<td>How much attention do you pay to news stories about food safety on blogs?</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC5</td>
<td>How much attention do you pay to news stories about food safety on social networking sites?</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Attitudes toward nanofood</td>
<td>ATT1</td>
<td>Nano ingredients in food are healthy.</td>
<td>0.94</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>ATT2</td>
<td>Nano ingredients in food are safe.</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATT3</td>
<td>I feel that nano ingredients in food products are risky.</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATT4</td>
<td>I feel that nano ingredients in food products are beneficial.</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>Willingness to purchase nanofood</td>
<td>PUR1</td>
<td>I would be willing to buy food products with nano ingredients.</td>
<td>0.91</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>PUR2</td>
<td>I would pay more for food products with nano ingredients.</td>
<td>0.85</td>
<td></td>
</tr>
</tbody>
</table>

---

Fig. 2 PLS results for the research model
On one hand, beliefs of science and food technology had a significant effect on attitudes toward nanofood ($\beta = 0.32, p < 0.01$) and this relationship remained significant after factoring in the influence of media consumption ($\beta = 0.26, p < 0.01$). On the other hand, the direct relationship between evaluations of food naturalness and attitudes toward nanofood was nonsignificant ($\beta = 0.13, n.s.$), and thus, the mediating effect of media consumption was absent (see Table II).

### TABLE II. Mediating Effect of Media Consumption

<table>
<thead>
<tr>
<th>IV</th>
<th>M</th>
<th>DV</th>
<th>IV → DV</th>
<th>IV → M</th>
<th>M → DV</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEF</td>
<td>MC</td>
<td>ATT</td>
<td>0.32**</td>
<td>0.29**</td>
<td>0.26**</td>
<td>0.19** Partial</td>
</tr>
<tr>
<td>EVA</td>
<td>MC</td>
<td>ATT</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: BEF = Beliefs of science and food technology, EVA = Evaluations of food naturalness, MC = Media consumption, ATT = Attitudes toward nanofood

* $p < 0.05$, ** $p < 0.01$

V. DISCUSSION

This study aimed to identify the impacts of food technology beliefs, food naturalness evaluations and media consumption on people’s attitudes toward nanofood as well as their willingness to purchase nanofood products. The mediating role of media consumption of food safety news was also explored, and our analysis suggested that it partially accounts for the influence of food technology beliefs on shaping attitudes.

The findings revealed that beliefs of science and food technology have a direct influence on attitudes toward nanofood. This suggests that individuals with positive beliefs that science and technology should be used to improve quality of life and food will have a similar positive inclination for food prepared using nanotechnology. Conversely, individuals with negative beliefs of science and technology regard nanoofood less favorably. This result is congruous with past studies that presented beliefs as a component in attitudinal assessments [29, 53] and of nanoofood in particular [55]. Thus, our findings suggest that promoting positive beliefs of science and technology may bolster attitudes toward nanoofood products, as nanotechnology continues to flourish in the food domain.

However, results did not support our hypothesis that food naturalness would have a direct, negative relationship with attitudes toward nanofood. This is not consistent with previous studies that demonstrated a relationship between a preference for natural food and perceived risks of nanoofood [14, 55]. However, our study participants’ attitudes toward nanoofood may have been based on the use of cereal as the mock product; most commercial cereal products are processed foods. [57] noted that consumers’ perception of food healthiness depends on the healthiness of the base product. We suspect the relationship between evaluations of food naturalness and attitudes toward nanoofood might be as we had hypothesized if future studies used non-processed foods, such as fruits and vegetables, as an example.

This study showed that science and food technology beliefs and food naturalness evaluations influenced media consumption of food safety news. Moreover, media consumption partially mediated the relationship between science and food technology beliefs and attitudes. This is consistent with [38] prediction of media use for gratifications, as well as the reasoning of selective exposure studies that individuals look to the media to reinforce their beliefs and values [41]. Media portrayals of food safety issues may not only affirm individuals’ attitudes toward science and technology as they seek information but also influence how individuals assess nanoofood in particular. The media may thus play a dual role in shaping expectancies and attitudes and warrants more focus as nanotechnology garners more public attention and expands its applications in the food we consume.

However, media consumption was not a mediator between food naturalness evaluations and attitudes in our data. The lack of a significant relationship suggests that the media do not influence the attitudes of individuals who have a preference for natural food. This departs from previous studies [9, 10]. It may be that media consumption is not the sole mediator in the relationship between food naturalness evaluations and attitudes toward nanoofood. This calls for future investigation to determine other factors that contribute to attitudes. Nonetheless, our study contributes to the current pool of literature on nanoofood by providing an alternative perspective into the relationship between food naturalness evaluations, media consumption, and nanoofood attitudes.

As discussed above, the influences of beliefs and evaluations extend beyond attitudes to behavioral intention [28–30]. Findings revealed that attitudes toward nanoofood have a positive relationship with willingness to purchase nanoofood. Consumers with favorable attitudes toward nanoofood products may thus be more inclined to purchase nanoofood products. This supports previous research with similar findings [46]. On the whole, our findings support the attitude-behavior interrelation predicted by EVT.

### A. Limitations

Although this study provides some insights on beliefs and evaluations as well as media consumption, it is not without its limitations. At the time of this study, nanotechnology and nanoofood had yet to receive mainstream public awareness and attention. Thus, the respondents’ assessments and attitudes toward nanoofood served as a litmus test, as attitudes to new technologies may change as knowledge grows [44]. This brings us to the second limitation: the cross-sectional nature of this research. While survey studies offer opportunities to assess inter-variable relations and test causal processes [58], they lack clear establishments of causality relative to designs such as experiments. Subsequent research could thus measure public attitudes using repeated cross-sectional or longitudinal designs as the issue of nanoofood gains more traction among the public, to capture more accurate findings.

Third, while this study demonstrated the role of the media in shaping attitudes, it does not speak to the possible influences of message content, format, or context (e.g., face-to-face versus mediated communication). This could be an interesting direction for further investigation. Finally, a panel design was
employed to obtain data, and thus generalizability of the findings may have been compromised. As panelists are often recruited on voluntary-basis, this gives rise to coverage and self-selection errors. Future studies should consider using probability sampling methods or adopt a mixed sampling approach to ensure external validity of data.

VI. CONCLUSION

This research draws on expectancy-value theories to understand the antecedents of attitudes toward nanofood in Singapore, providing a different perspective from previous research that studied the benefit-risk trade-off. Further, the results suggested that media consumption mediates the relationship between beliefs about science and technology and attitudes toward nanofood. There is thus contribution to results suggested that media consumption mediates the probability sampling methods or adopt a mixed sampling approach to ensure external validity of data.

REFERENCES


[34] K. G. Grunert, L. Lähteenmäki, N. Asger Nielsen, J. B. Poulsen, O. Ueland, and A. Åström, “Consumer perceptions of food products


