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A cross-country investigation of social image motivation and acceptance of lab-grown meat in Singapore and the United States

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Abstract

This research has three goals. First, it sets out to compare consumer acceptance of lab-grown meat in the U.S. and in Singapore. Second, it seeks to explain the difference in Americans' and Singaporeans' acceptance of lab-grown meat by examining their eating motivations. Specifically, we focused on social image motivations – the motivations to present oneself positively in social contexts. Third, this study also aims to assess if exposure to information about lab-grown meat communicated by celebrity versus expert social media influencers (SMIs) can impact people's acceptance of lab-grown meat products. Our analysis showed that Singaporean participants had greater acceptance of lab-grown meat compared to their American counterparts, and this cultural difference was explained by Singaporeans' stronger social image eating motivations. In other words, cross-country differences in motivation to eat for a favorable social image can explain differences in consumer acceptance of lab-grown meat. The Singaporean cultural trait of kiasuism, which is exemplified by the fear of losing out or being left behind, may explain Singaporeans' motivation to project an image of being 'trailblazers' (vis-a-vis other nationalities) by expressing a higher acceptance of novel foods such as lab-grown meat. Results also revealed that the information about lab-grown meat being communicated by a celebrity or an expert SMI did not make a difference in participants' acceptance of lab-grown meat in both countries. Together, this research suggests an interesting implication that novel food industries and marketers can promote product branding by boosting media coverage (including online social media) of their lab-grown products' 'firsts' (e.g., the first production line in the world, the first technological breakthrough), especially in markets with high social image concerns.

Keywords: Alternative proteins, lab-grown meat, eating motivations, social image, social media influencers (SMIs)

1. Introduction

The current food systems' negative impact on the environment (Aiking, 2011; Godfray et al., 2018; Poore & Nemecek, 2018; Willett, et al., 2019) and public health (Willett et al., 2019; Tilman & Clark, 2014) may be alleviated by a move away from the consumption of animal-based proteins towards non-animal-based products (Possidonio, Prada, Graca, & Piazza, 2021). Nonetheless, annual global meat consumption continues to increase (Ritchie & Roser (2019) and consumer resistance towards changing their meat-based diets is significant (Hartmann & Siegrist, 2017). The development of interventions to promote alternative proteins (i.e., plant-based proteins, edible insects, and cellular agriculture; Sexton, Garnett, & Lorimer, 2019) as accessible and appealing options may facilitate the transition towards healthier and more sustainable food consumption (de Boer & Aiking, 2017; Godfray et al., 2018; Graca, Godinho, & Truinger, 2019; Possidonio et al., 2021).

One type of alternative protein – lab-grown meat (also known as cultured meat, cell-based meat, *in vitro* meat, and clean meat) – is designed to have conventional meat's sensory and nutritional characteristics, thus satisfying some consumers' demand for meat-based diets. Yet, the main difference is lab-grown meat's method of production (Parodi et al., 2018; Padhila, Malek, & Umberger, 2021), which involves extracting muscle-specific stem cells and subsequently cultivating them into muscle tissue (Post et al., 2020; Post, 2012, 2014). Lab-grown meat could potentially augment existing traditional meat (protein) supply (Teng, Montesclaros, Hulme, & Powell, 2019). This is especially pertinent during the COVID-19 pandemic, which has demonstrated how vulnerable countries in the world are to major disruptions in the global food supply chain (Teng, 2020). At the same time, lab-grown meat production uses less water and arable land and addresses concerns around animal ethics and food security (Teng, Montesclaros, Hulme, & Powell, 2019). Historically, however, the

introduction of novel food technologies (e.g., Genetically Modified Organisms) has often been met with consumer hesitancy and even rejection (Siegrist & Hartmann, 2020).

1.1 Cross-Country Differences in Acceptance of Lab-Grown Meat

As discussed, lab-grown meat can potentially address meat supply and environmental challenges, which are timely and global issues. Yet, research is still limited in examining how people from different cultural backgrounds react to this kind of novel food. In this context, we set out to conduct the first empirical investigation to compare the acceptability of lab-grown meat between a representative Western country (the U.S.) and a representative East Asian country (Singapore). Both being a developed country, we are interested in examining whether there is any cross-country difference in Americans' and Singaporeans' acceptance of lab-grown meat.

RQ1: Are there differences between Americans' and Singaporeans' acceptance of lab-grown meat?

1.1.1 Social Image Motivations

As an important follow-up to the above question, another goal of the current research is to examine why there are cross-country differences in the acceptance of lab-grown meat between Americans and Singaporeans – if such differences do exist. We examined social image motivations as one mechanism underlying potential cross-country differences. People choose foods not only for nutritional and sensory reasons but also to convey a particular impression of themselves to others, especially in social situations (Herman, Roth, & Polivy, 2003; Renner et al., 2012; Vartanian, 2015). As with a number of health behaviors (Leary, Tchividjian, & Kraxberger, 1994), impression management[2] can be salient in the domain of food consumption and influence people's choice of food (Vartanian, 2015). For example,

[2] Impression management refers to individuals' adjustment of their behavior to create a particular impression of themselves (Leary, 1995).

several studies (Gal & Wilkie, 2010; White & Dahl, 2006) indicated that men engage in impression management – via their food intake – to boost their masculine identity. Nonetheless, this motive to 'look good' is often implicit rather than explicit, as individuals may not be fully conscious of their own intentions (Herman et al., 2003; Robinson, Tobias, Shaw, Freeman, & Higgs, 2011).

In the case that cross-country differences in Americans' and Singaporeans' acceptance of lab-grown meat are found, we seek to explain such differences by examining people's social image motivations, which include the desire to stand out and the desire to manage a positive impression (Renner, Sproesser, Strohbach, & Schupp, 2012). Across multiple studies, the influence of social others and the social environment on consumer acceptance of alternative proteins is clear (e.g. Lensvelt & Steenbekkers, 2014; Hartmann, Shi, Giusto, & Siegrist, 2015; Onwezen, Bouwman, Reinders, & Davegos, 2021). As such, we examined if social image concerns would underline American and Singaporean individuals' acceptance of lab-grown meat.

According to the seminal works on cultural tightness and looseness, countries that are culturally "loose" (e.g., the U.S.) have weaker social norms and higher tolerance of deviant behaviors (Gelfand et al., 2011). As consuming lab-grown meat is still not yet a typical eating behavior, individuals in a culturally loose country (e.g., Americans) may be more willing to try the novel product as compared to those in a culturally tight country. Research has suggested that people in loose cultures prefer to adopt a thinking or behavioral style that allows them to express themselves in a unique way and to do things differently (Chua, Huang, & Jin, 2019). Therefore, the motive of standing out through eating behavior or food choice can be considered as one form of self-expression that is more aligned with loose cultures (e.g., the U.S.) that afford a wider range of permissible behaviors.

As for Singaporean consumers, we posit that they are more likely to put a greater emphasis on the social image motivation of impression management than American consumers. This argument is based on Singaporeans' distinguishing cultural trait of "kiasuism", which is a mindset that constantly entails "comparison with others…to avoid falling behind or losing out to others" (Bedford & Chua, 2018, p. 504). Given this culturally motivated concern to get ahead of others (Hwang, Ang, & Francesco, 2002), we argue that Singaporean consumers may have a strong desire to engage in the impression management tactic by showing others that they are the 'trailblazers' (e.g., the first among their friends to try lab-grown meat). Thus, we pose our second research question:

> RQ2: If Americans are found to be more accepting of lab-grown meat than Singaporeans, would the former's stronger social image motivation (of standing out) explain why they have a greater acceptance of lab-grown meat? But if Singaporeans are found to be more accepting of lab-grown meat than Americans, would the former's stronger social image motivation (of impression management) explain why they have a greater acceptance of lab-grown meat?

Together, the current research examined social image motivations as potential explanatory mechanisms for the cross-country difference in the acceptability of lab-grown meat.

1.2. Communication by Social Media Influencers

In this digitally networked environment, SMIs have become important sources of social influence (Kim, 2021; Shan, Chen, & Lin, 2019). SMIs are defined as individuals who have built a credible reputation and sizeable following on social media, often in a niche area such as food (Khamis, Ang, & Welling, 2017). For over a decade, professional marketers have used SMIs as an effective way to sell products (Backaler, 2018). SMIs' effectiveness in achieving significant digital engagement and positive health outcomes for their followers (Kostygina et al., 2020; Diaz-Martin, Schmitz, & Guillen, 2020; Lutkenhaus, Jansz, &

Bouman, 2019) augurs well for the application of SMI engagement to other fields such as promoting novel food acceptance.

SMIs typically possess either knowledge or expertise in a given area (referred to as "expert power") and/or attractiveness to consumers (referred to as "referent power"; Uzunoglu & Kip, 2014; Wang, Huang, & Davison, 2020). Whereas expert power is based on knowledge or skills in a given domain, referent power is based on the strong potential that an individual shows qualities that can make others feel desirable to identify and closely connect with him/her (Raven, Schwarzwald, & Koslowsky, 1998). Accordingly, referent power is associated with SMIs who have some degrees of fame or popularity (i.e., celebrity social influencers), while expert power is associated with SMIs who are domain experts (i.e., expert social influencers; Lindh & Lisichkova, 2017). Social power theory suggests that an individual or a group of individuals with some forms of social influence (e.g., SMIs) can elicit changes in people's psychological processes or behaviors (Raven, Schwarzwald, & Koslowsky, 1998).

As another research goal, this study represents a first attempt to examine the following research question:

RQ3: Are there any differences in lab-grown meat acceptance between the celebrity and expert influencer conditions when information about lab-grown meat is communicated to consumers?

2. Method

2.1. Participants

A total of 662 Singaporeans and 826 Americans were recruited for the study through the online data collection company Qualtrics Panel. For both samples, we recruited respondents who are at least 18 years old using quota sampling to ensure that the samples' gender and ethnic make-up was representative of the population characteristics in Singapore

(Singapore Department of Statistics, 2020) and the United States (Unites States Census Bureau, 2020). To enhance data quality, participants who were not comfortable with communicating in English ($N_{Singapore} = 7$; $N_{America} = 5$), failed the honesty check ($N_{Singapore} = 3$; $N_{America} = 8$), or the attention check ($N_{Singapore} = 36$; $N_{America} = 54$) were excluded. This resulted in a final sample of 616 Singaporeans and 759 Americans for data analysis (see Table 1 for descriptive statistics of both samples).

2.2. Procedure

The study was conducted using Qualtrics (an online survey platform) and the survey took appropriately eight minutes to complete. Prior to the main study, participants completed a pre-study screener which requested for their demographic information (nationality, gender, ethnicity) and dietary preference. Due to the nature of the study examining openness to lab-grown meat, one selection criterion concerns whether participants consume meat products. Participants reported whether they identified themselves as lacto-ovo vegetarian, lacto-vegetarian, ovo-vegetarian, vegan, or none of the above. Only participants who were not self-identified as a vegetarian nor vegan were eligible for the main study.

After giving informed consent, to introduce the study as examining people's acceptance towards lab-grown meat, the participants were told that the study aimed to understand people's stance towards certain issues after exposure to visual information in the form of social media posts. Specifically, the information about lab-grown meat was presented in some Instagram posts of a social media influencer. Instead of directly asking participants their acceptance of lab-grown meat, the current study used social media as a channel to present the potentially controversial issue to the participants, which could make the presentation more natural and contextualized. More importantly, this design also allowed us to explore if the information about lab-grown meat being presented in a celebrity or an expert influencer's posts would make a difference on people's acceptance of lab-grown meat

192 products. To ensure that participants had the same understanding of lab-grown meat, the
193 definition was given:

194 *Lab-grown meat (also called cultured meat or cell-based meat) is real meat which is*
195 *grown from animal cells without the need to raise animals. It should not be confused*
196 *with meat substitutes such as soy. Since it is real animal meat, it has the same taste,*
197 *texture, and the same or better nutritional content as conventionally produced meat.*

198 Next, participants were randomly assigned (via Qualtrics' in-built randomizer) to
199 either the celebrity influencer or the expert influencer condition, with the corresponding
200 photo-realistic profile picture of a Western (for American participants) or an Asian (for
201 Singaporean participants) influencer generated by a software from Artbreeder.com. In the
202 celebrity influencer condition, participants were told that the influencer, Rosie, is one of the
203 top 200 Instagram influencers in her country, with 198,000 (for the Singaporean sample) or
204 17.8 million followers (for the American sample) on Instagram. These figures were based on
205 actual data of Instagram celebrity influencers in Singapore and the United States, respectively
206 (https://starngage.com/app/global/influencer/ranking/singapore;
207 https://starngage.com/app/global/influencer/ranking/united-states; accessed March 31, 2021).
208 In the expert influencer condition, the participants were told that the influencer, Rosie, has a
209 Ph.D. in food sciences and is a researcher at A*Star (for the Singaporean sample) or the
210 International Food Policy Research Institute (for the American sample), with a strong passion
211 for fitness and healthy living. These institutions were the research centres working on food-
212 related research in Singapore and the United States, respectively. In both conditions, Rosie
213 was depicted as an influencer hoping to increase awareness of the impact of food choices on
214 people's health, fitness, and the environment.

215 Following the introduction, participants were asked to read four featured Instagram
216 posts allegedly from the influencer's account (Appendix A). The first two Instagram posts

emphasized the influencer's identity (i.e., posts about fitness and health for the celebrity influencer, and posts about research work for the expert influencer). The last two Instagram posts were identical across both conditions and featured pictures of food made from lab-grown chicken meat along with captions depicting the influencer's consumption of and positive attitude towards lab-grown meat.

Finally, participants completed several scales measuring their acceptance of lab-grown meat and their eating motivations. The survey also embedded some attention check and honesty check items to screen out low-quality responses. Participants provided some demographic information before they were debriefed about the purpose of the study.

2.3. Measures

2.3.1. Acceptance of lab-grown meat. Participants were asked to rate their attitude towards lab-grown meat, willingness to try lab-grown meat, willingness to buy lab-grown meat, willingness to eat lab-grown meat as a replacement for conventionally produced meat, and willingness to eat lab-grown meat compared to plant-based meat substitutes (adapted from Bryant & Dillard, 2019; Wilks & Phillips, 2017). These five items were rated on a 5-point scale (1 = *Not favorable at all/ Definitely no*, 5 = *Very favorable/ Definitely yes*). The scores of all items were aggregated to form a composite acceptance measure towards lab-grown meat, where higher scores indicated greater acceptance of lab-grown meat. As an attention check, at the end of the acceptance measure, participants were asked to indicate whether Rosie is a researcher with a Ph.D. in food sciences or is one of the top 50 local Instagram celebrity influencers. Those participants whose answer did not match the social media influencer condition they were assigned to ($N_{\text{Singapore}} = 36$; $N_{\text{America}} = 54$) were excluded in the main analysis.

To support the score aggregation of the five-item measure of acceptance of lab-grown meat, we tested the factor structure of the measure by carrying out a confirmatory factor

analysis (CFA) in R version 3.6.3 (R Core Team, 2020), using R package lavaan version 0.6-8 (Rosseel, 2012). We found that the one-factor structure displayed excellent fit for the current data (CFI = 0.979, TLI = 0.958, RMSEA = 0.117, SRMR = 0.018), suggesting that the five items measured a unidimensional construct of acceptance towards lab-grown meat. Additionally, the measure was found to be internally consistent in both countries ($\alpha_{Singapore}$ = .94; $\alpha_{America}$ = .96).

2.3.2. Eating motivations. Participants' endorsement of social image as a motivation to consume particular foods was measured by the Social Image subscale of The Eating Motivations Survey (Renner et al., 2012). The social image eating motivation is characterized by "the consumption of food to present oneself positively in social contexts" (Renner et al., 2012). Participants responded to five statements — I eat what I eat… "because it is trendy", "because it makes me look good in front of others", "because others like it", "to stand out from the crowd", and "because it is considered to be special" — on a seven-point scale (1 = *Never*, 7 = *Always*).

To examine the one-factor structure of the scale which is in line with Renner et al. (2012), a CFA was conducted. The one-factor model (Figure 1) displayed acceptable fit (CFI = 0.979, TLI = 0.958, RMSEA = 0.117, SRMR = 0.018; Bentler & Bonett, 1980). The measure was additionally found to be internally consistent in both countries ($\alpha_{Singapore}$ = .91; $\alpha_{America}$ = .90).

2.3.3. Demographic covariates. Demographic variables (gender, ethnicity, age, and household income levels) were included as covariates in our analyses because they might affect people's receptivity towards lab-grown meat. Gender was dummy coded with female as the reference category and ethnicity was dummy coded with the minority race (i.e., non-Chinese in Singapore, non-White in America) as the reference category. Age was reported in years and annual household income was measured on an 8-point scale (1 = *SGD/USD15,000*

or less, 8 = *SGD/USD150,000 or more*) and standardized within each country to ensure comparability across countries.

2.4. Analytical Methods

All analyses except for mediation analyses were conducted in R version 3.6.3 (R Core Team, 2020). Mediation analyses were conducted using the SPSS PROCESS macro (Model 4; Hayes, 2017). Social influencer type and country were dummy coded with the expert influencer condition and the Singaporean sample being the reference categories. The zero-order Pearson correlation table for all variables measured in the study are presented in Appendix B. The raw dataset, R script, and SPSS syntax files used can be found in https://researchbox.org/403&PEER_REVIEW_passcode=APLPSD.

3. Results

3.1. Between-country and between-influencer differences

To examine whether there were between-country differences (RQ1) and between-influencer differences (RQ3) in acceptance of lab-grown meat, a two-way ANOVA (Table 2) was conducted with country and social influencer type as predictors. There was no main effect of social influencer type nor interaction effect between country and social influencer type on acceptance of lab-grown meat (ps > .826). However, a significant main effect of country was observed, where Singaporean participants (M = 3.02, SD = 1.05) showed greater acceptance of lab-grown meat compared to the American participants (M = 2.58, SD = 1.21; β = -.18, b = -0.42, SE = 0.09, p < .001). These results remained consistent even after controlling for gender, ethnicity, age, and household income (β = -.12, b = -0.27, SE = 0.09, p = .003; Table 2).

Additionally, although we used random assignment to put participants into either the celebrity or the expert influencer condition, to ensure that both groups were comparable we examined participants' demographic make-up and eating motivations between the two

influencer conditions. An independent samples *t*-test was conducted with each demographic variable (gender, ethnicity, age, and household income levels) and eating motivations as outcome variables in separate models. We found no significant differences between participants in the celebrity and expert condition in terms of gender proportion ($p = .570$), ethnicity proportion ($p = .397$), age ($p = .781$), and household income levels ($p = .164$). Additionally, there were no significant differences between the two conditions in social image eating motivations ($M_{celebrity} = 2.87$, $SD = 1.45$; $M_{expert} = 2.76$, $SD = 1.42$; $t(1373) = -1.34$, $p = .179$). Taken together, we found that participants randomly assigned to the celebrity or the expert influencer condition were comparable in terms of demographic characteristics and eating motivations.

3.2. Mediation analyses

As between-country differences in acceptance of lab-grown meat were found, next we examined whether social image eating motivations could explain the more favorable attitude held by the Singaporean participants (RQ2). We conducted mediation analyses using the SPSS PROCESS macro (Model 4; Hayes, 2017). Country was specified as the predictor variable and acceptance of lab-grown meat as the outcome variable. Social image eating motivations was entered as the mediator in the model (Figure 2). Results revealed that the dummy country variable (Singapore = 0, the U.S. = 1) was negatively associated with social image eating motivations ($\beta = -.56$, $b = -0.80$, $SE = 0.08$, $p < .001$; Figure 2). In turn, social image eating motivations was positively associated with acceptance of lab-grown meat ($\beta = .26$, $b = 0.21$, $SE = 0.02$, $p < .001$).

A bootstrap estimation analysis was conducted with 5,000 samples for the indirect path (Shrout & Bolger, 2002). Results indicated that the indirect path with social image eating motivations as a mediator was significant ($b = -0.17$, Boot $SE = 0.03$, 95% C.I. = [-0.22, -0.12]; Figure 2). The significant indirect effect of social image eating motivations

remained significant after controlling for gender, ethnicity, age, household income, and social influencer condition (b = -0.13, SE = 0.02, 95% C.I. = [-0.18, -0.09]). Therefore, the results suggest that Singaporean (vs. American) participants were more motivated to eat for social image reasons, which in turn led to their greater acceptance of lab-grown meat.

4. Discussion and Conclusion

In novel food research, limited attention has been paid to the impact of social image concerns on consumer acceptance of alternative proteins. To our knowledge, this study is the first to show that cross-country differences in social image eating motivations can explain differences in consumer acceptance of lab-grown meat. In our study, Singaporean participants were found to have a higher acceptance of lab-grown meat than their American counterparts (RQ1). Importantly, our results showed that Singaporeans' more favorable attitude towards lab-grown meat relative to the Americans can be explained by their social image eating motivations (RQ2). It is likely that the Singaporean cultural trait of kiasuism, which is exemplified by the fear of losing out or being left behind, motivates Singaporeans to project an image of being 'ahead of the curve' in their thinking and behavior (compared to other nationalities) by being more receptive to novel foods such as lab-grown meat. This motivation may have received impetus from international and local media coverage of Singapore's 2020 approval of lab-grown chicken for sale and consumption – the first country in the world to do so. The following is a sample of the international and national news headlines on the event:

> *Singapore approves sale of lab-grown meat in world first (*Aravindan & Geddie, 2020*).*
>
> *In a world first, cultured chicken meat approved for sale in Singapore* (Tan, 2020).
>
> *Lab-grown chicken to be sold in Singapore after 'world's first' approval for cultured meat (Phua, 2020).*

345 According to cultivation theory (Gerbner, 1966; Morgan & Shanahan, 2010),
346 cumulative exposure to media coverage can influence consumer attitudes toward brands and
347 products (Wei, McIntyre, & Straub, 2020). Thus, Singaporeans' exposure to news on
348 Singapore being the 'first in the world' may have promoted their acceptance of lab-grown
349 meat, as acceptance can be worn as a 'badge' of their (and their country's) innovativeness
350 compared to other 'laggard' nations. As the media draws people's attention to the emergence
351 of a new norm – for example, Singapore teenagers were the first in the world to order Eat
352 Just's lab-grown chicken (Starostinetskaya, 2020) – the previously non-normative behavior
353 of consuming lab-grown meat may become more acceptable (Sparkman & Walton, 2017,
354 2019).

355 Our findings have important implications for novel food industries' global market
356 strategy. As people in collectivistic societies (e.g., Singapore) are more likely than people in
357 individualistic ones (e.g. the U.S.) to focus on social image concerns, alternative protein
358 companies and brands might consider prioritizing product launches in collectivistic (e.g.,
359 Asian) countries to increase market share. This is especially true if the visibility of a
360 product's usage to others is high or portrayed to be so, such as when social media coverage
361 can make the use of the product highly visible to people's followers. Because collectivistic
362 consumers are more concerned about saving and gaining face, they will be more driven to
363 present a desirable impression of themselves or to gain higher prestige by also using or
364 endorsing a product that is visibly popular among others (Baumeister & Leary, 1995).

365 In the United States, sales of plant-based meats such as Impossible Burger appear to
366 have benefitted from the organic endorsements of celebrity influencers such as Madonna,
367 Miley Cyrus, Natalie Portman, Mark Wahlberg and Chrissy Teigen (Bradley, 2019).
368 However, our study shows that celebrity influencers did not have a different impact on
369 consumers' acceptance of lab-grown meat in the U.S. and Singapore vis-à-vis expert

influencers (RQ3). Future research could be conducted to examine whether different types of SMIs influence consumer sentiments toward lab-grown meat.

We would want to acknowledge the limitations of the current research and encourage future studies to address these limitations. First, the present study's use of fictitious rather than real SMIs may have affected participants' responses. Audience identification with – and the credibility of – SMIs have been shown to mediate the relationship between the type of endorsers and message effectiveness (Schouten, Janssen, & Verspaget, 2020). It could be unlikely for our participants to have strongly identified with the study's non-real-life SMIs or found them to be highly credible. While we acknowledge these limitations, the random assignment of the carefully crafted SMI personas and Instagram materials was intended for the purpose of carrying out a true experiment that allows for the testing of a cause-effect relationship between people's exposure to a given influencer type (celebrity vs. expert SMI) and their acceptance of lab-grown meat. We encourage future research to combine the study of real-life SMIs and experimentally manipulated SMIs to further test the reproducibility of the current findings.

Second, the participants responded to general questions about their pre-existing perceptions of lab-grown meat, which can be very different if they are informed by actual product experience. Nevertheless, we still believe that these sentiments and preconceived impressions towards lab-grown meat products are important to study because many people are still unfamiliar with alternative protein products.

Third, although we have argued that people's exposure to media messages on lab-grown meat might make salient their social image eating motivations, particularly among Singaporeans, the current study did not measure their media exposure. It would be valuable for future research to confirm if media exposure reinforces Singaporean consumers' social image eating motivations, thus promoting their openness to lab-grown meat. Finally, due to

survey length constraints, some relevant variables (e.g., sustainability concern, health concern, perceived naturalness, food technology neophobia) have been left out of this study. Future research should consider examining these variables to enrich this study's findings.

Given increasing media coverage on lab-grown meat and other alternative protein products, we see great promise in examining how this emerging social norm can affect current acceptance and consumption behavior. Social norms reflect whether certain behaviors are approved or disapproved by others. Although the consumption of alternative proteins may be increasing, they are still non-normative in many societies. Recent research found support that communicating the dynamic social norm (i.e., the norm that has changed over time) as opposed to the static social norm (e.g., the current norm) serves to encourage behaviors currently viewed as non-normative (Sparkman & Walton, 2017, 2019). We are currently pursuing this line of research to examine how making salient the emerging dynamic norm of trying out lab-grown meat will impact people's acceptance of this novel food.

Ethical statement

Procedures performed in the study received the approval of, and were in accordance with, the ethical standards of Singapore Management University's Institutional Review Board (IRB-21-067-A062-M2(721). Participants gave informed consent before taking part in the study.

Author contributions

Mark Chong and Angela Leung contributed to its conception. Verity Lua and Angela Leung analyzed the data. Mark Chong and Angela Leung have worked jointly to write and revise the manuscript several times and have approved the final version; all of the authors have approved the manuscript submission; none of the authors has any conflict of interest to declare.

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Data availability

The data used in the current study can be accessed at:

https://researchbox.org/403&PEER_REVIEW_passcode=APLPSD.

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Tables

Table 1. Descriptive statistics of demographic and key variables for the Singaporean ($N = 616$) sample and the American ($N = 759$) sample.

	Celebrity influencer condition				Expert influencer condition			
	N	*M*	(*SD*)	Range	*N*	*M*	(*SD*)	Range
Singaporean Sample								
Key Outcome Variable								
Acceptance of lab-grown meat	304	3.01	1.08	1 — 5	312	3.03	1.03	1 — 5
Social image eating motivations	304	3.42	1.38	1 — 7	312	3.10	1.37	1 — 7
Demographic Variables								
Ethnicity (% Majority race)	304	75.00%			312	75.00%		
Gender (% Male)	304	50.33%			312	48.40%		
Income	304	-0.03	1.00	-1.86 — 1.34	312	0.03	1.00	-1.86 — 1.34
Age	304	39.08	12.27	18 — 84	312	39.44	13.00	18 — 76
American Sample								
Key Outcome Variable								
Acceptance of lab-grown meat	385	2.57	1.23	1 — 5	374	2.60	1.19	1 — 5
Social image eating motivations	385	2.43	1.36	1 — 7	374	2.48	1.40	1 — 7
Demographic Variables								
Ethnicity (% Majority race)	385	55.58%			374	59.09%		
Gender (% Male)	385	49.35%			374	48.13%		
Income	385	-0.04	1.00	-1.54 — 1.93	374	0.04	1.00	-1.54 — 1.93
Age	385	50.34	19.08	18 — 92	374	50.79	19.04	18 — 93

Note. Ethnicity and gender were dummy coded with the minority race and females acting as reference categories. Annual household income was standardized within countries.

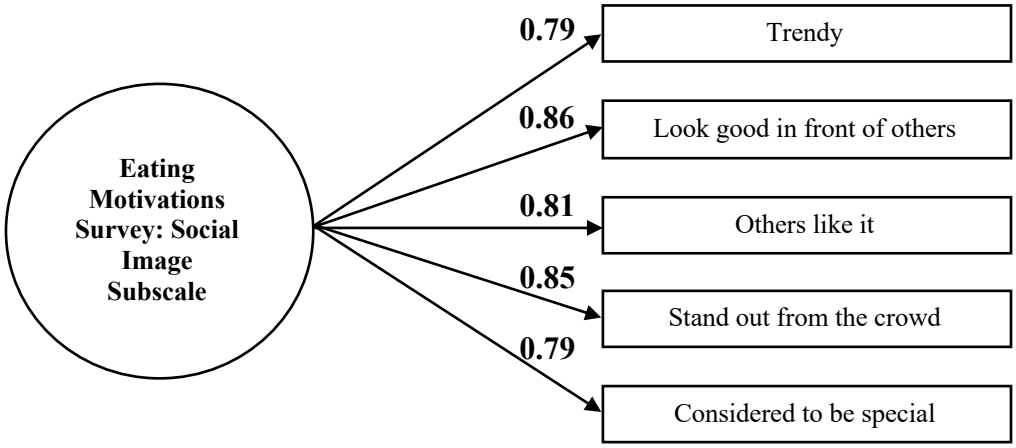
Table 2. Results of the two-way ANOVA with country and social influencer type as predictors and acceptance of lab-grown meat as the outcome variable.

	Unadjusted model				Adjusted model			
	B	*b*	(*SE*)		β	*b*	(*SE*)	
Intercept		3.03	0.06	***		3.38	0.10	***
Main effects								
Country (0 = Singapore)	-.18	-0.42	0.09	***	-.12	-0.27	0.09	**
Condition (0 = Expert influencer condition)	-.01	-0.02	0.09		-.01	-0.02	0.09	
Two-way interaction								
Country × Condition	-.01	-0.01	0.12		.00	-0.01	0.12	
Demographic covariates								
Gender (0 = Female)					.11	0.27	0.06	***
Ethnicity (0 = non-White/ non-Chinese)					.01	0.03	0.07	
Age					-.19	-0.01	0.00	***
Income					.13	0.15	0.03	***

Note. Country, influencer condition, ethnicity, and gender were dummy coded with the Singaporean sample, expert influencer condition, minority races, and females serving as reference categories. Annual household income was standardized within countries. *$p < .05$, **$p < .01$, ***$p < .001$.

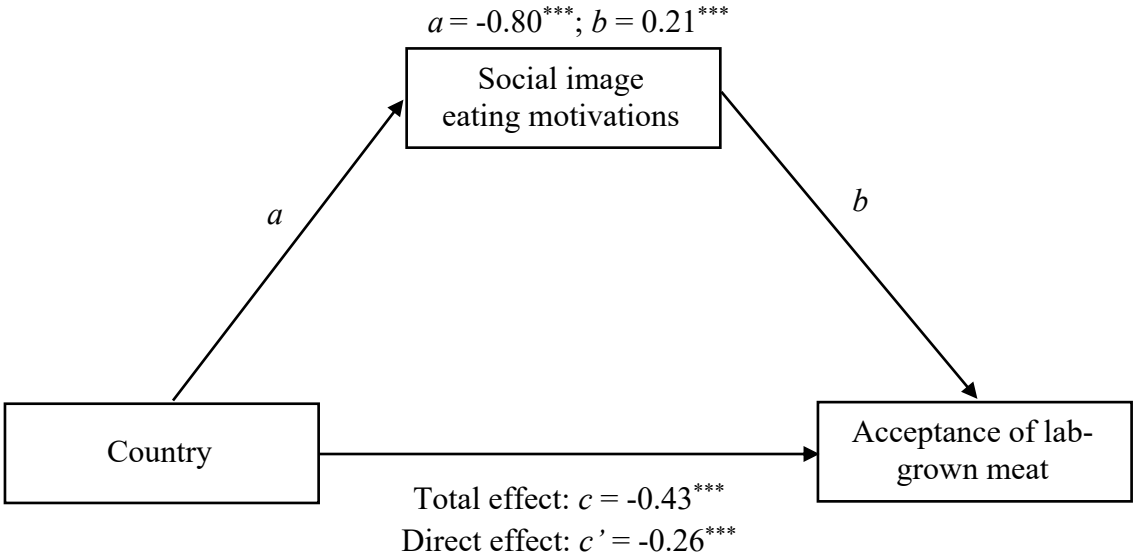
Figures

Figure 1. Factor loadings of items in the one-factor model of social image eating motivations.



Note. The circle represents the latent variable of social image as eating motivations and boxes represent manifest variables (items). Single-headed arrows connecting the latent variable to the manifest variables represent standardized factor loadings. All factor loadings were statistically significant ($p < .05$).

Figure 2. Visual representation of the unadjusted mediation model.

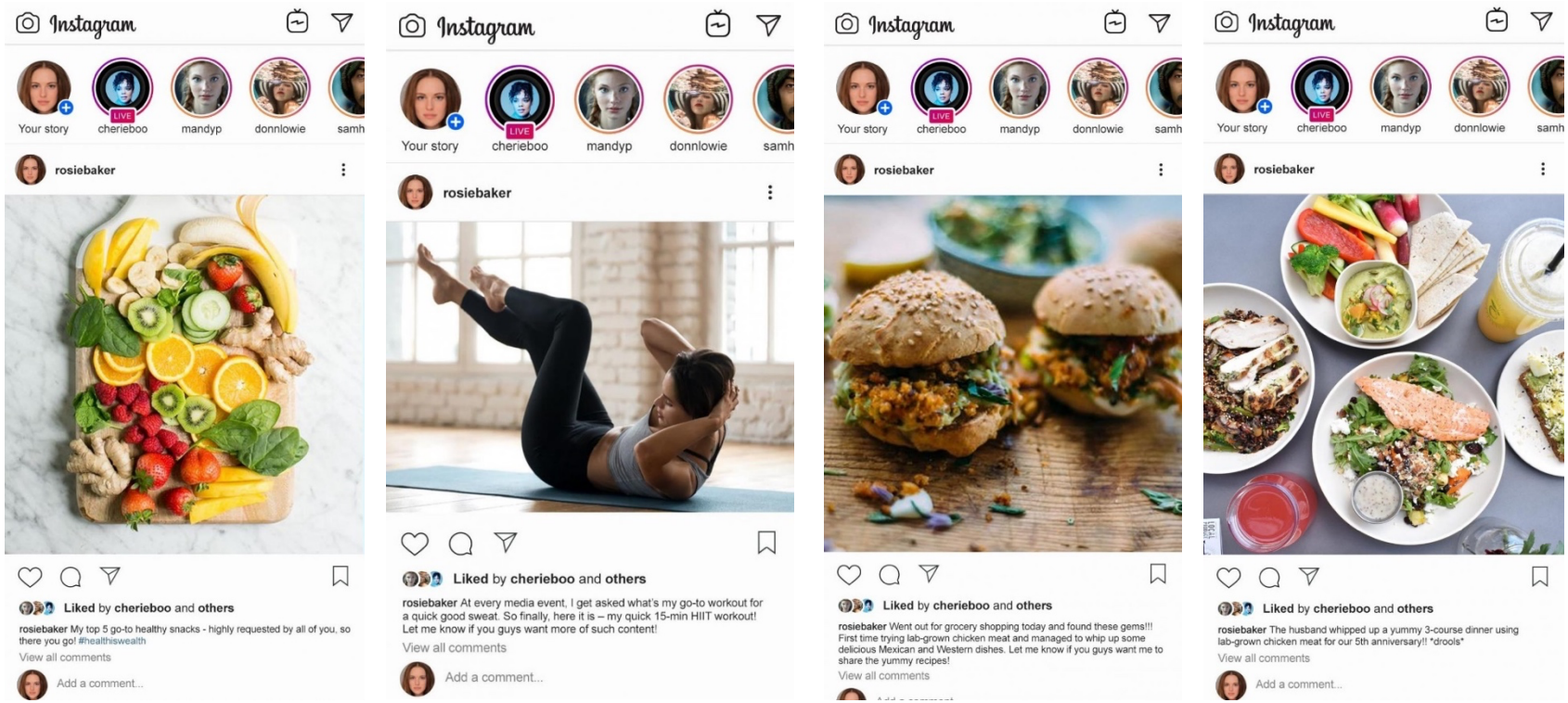


Note. The figure depicts the mediation model tested in the study. *a* refers to the regression coefficient of social image eating motivations on country. *b* refers to the regression coefficient of acceptance lab-grown meat on social image eating motivations. The values depicted in the figure are based on the results of the unadjusted mediation analyses. *$p < .05$, **$p < .01$, ***$p < .001$

Appendix

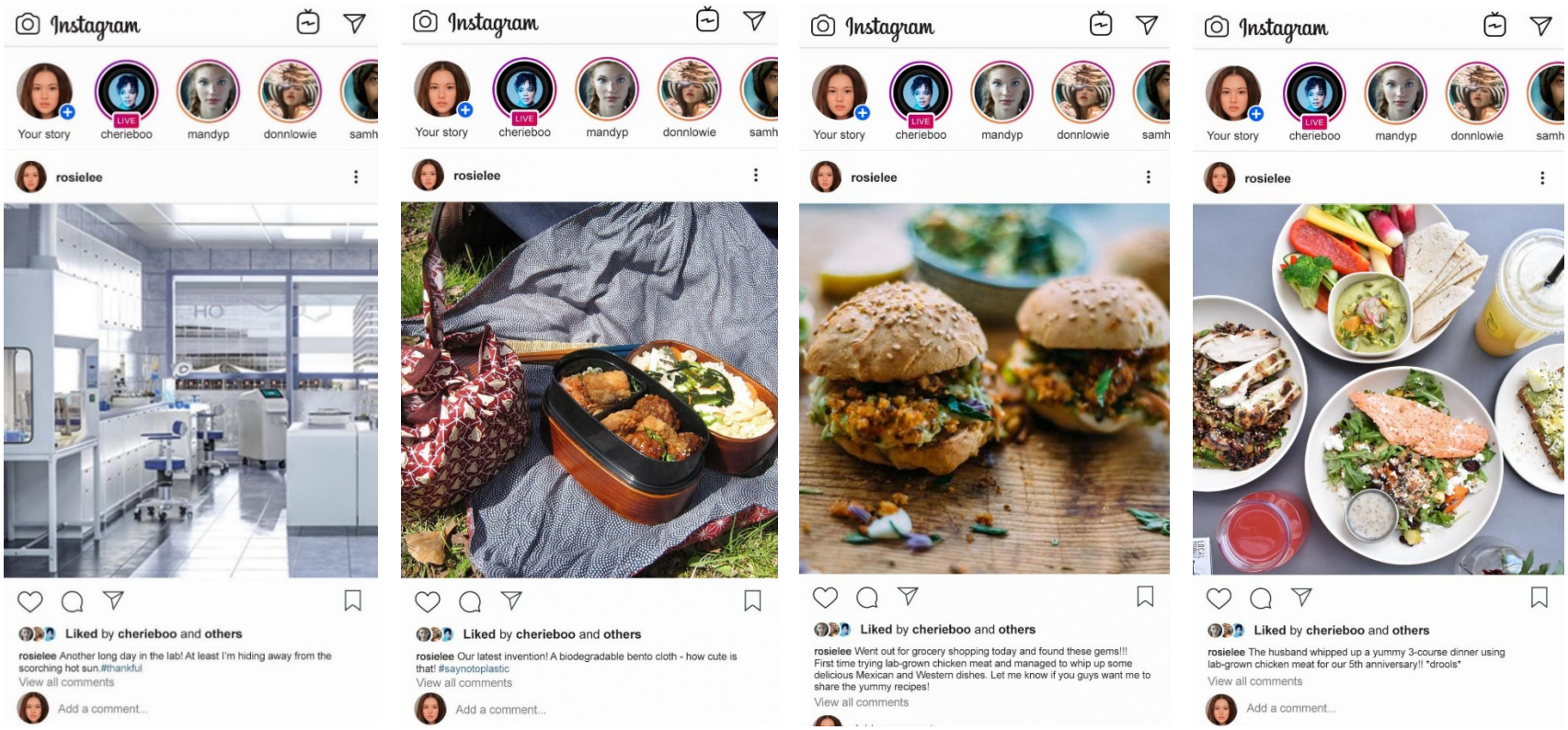
Appendix A. Instagram posts by a celebrity and an expert social influencer presented to the participants.

Celebrity social influencer posts:



Note: For the Singaporean sample, the influencer's username is "rosielee" and the profile picture shows an Asian female (see the profile image in the expert social influencer posts). Apart from the username and profile image, the American and Singaporean participants were presented the same pictures and captions for the Instagram posts.

Expert social influencer posts:



Note: For the American sample, the influencer's username is "rosiebaker" and the profile picture shows a Western female (see the profile image in the celebrity social influencer posts). Apart from the username and profile image, the American and Singaporean participants were presented the same pictures and captions for the Instagram posts.

Appendix B. Zero-order Pearson correlations of all variables used in the study (N = 1,375).

		1	2	3	4	5	6	7
1	Acceptance of lab-grown meat							
2	Social image eating motivations	.29***						
3	Country (0 = Singapore)	-.19***	-.28***					
4	Condition (0 = Expert influencer condition)	-.02	.04	.01				
5	Ethnicity (0 = non-White/ non-Chinese)	.02	-.03	-.19***	-.02			
6	Gender (0 = Female)	.08**	.01	-.01	.02	.23***		
7	Age	-.17***	-.22***	.32***	-.01	.33***	.28***	
8	Income	.11***	.09***	.00	-.04	.21***	.16***	.18***

Note. The table shows the zero-order Pearson correlations of all variables in the full sample. Country, influencer condition, ethnicity, and gender were dummy coded with the Singaporean sample, expert influencer condition, minority races, and females serving as reference categories. Annual household income was standardized within countries. *$p < .05$, **$p < .01$, ***$p < .001$.