

**What Do They Value? Predicting U.S. Consumer Attitudes Toward Gene-Editing**

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## Introduction

Gene-editing can responsibly contribute to agricultural productivity, food security, and environmental sustainability (Kuzma, 2018). For the technology to strengthen food and agricultural systems in this capacity, consumers' acceptance of gene-editing should be considered in the early stages of technology development before gene-edited foods reach retail (Frewer et al., 2011). That way, agriculturalists and food manufacturers can predict profitable developments and implement science communication strategies designed to improve consumers' likelihood of purchasing such products. At this point, we know little about how consumers will respond to gene-edited foods (Yang & Hobbs, 2020). Because gene-edited foods may reach retail within five to 10 years, now is the time to determine which psychological factors most influence consumers' decision-making processes about gene-edited foods. Such research responds to the AAAE Research Agenda's call to develop effective methods of communicating and informing public opinion about agriculture (Roberts et al., 2016).

## Theoretical Framework

Homer and Kahle's (1988) value-attitude-behavior model guided the study. The model posits that values indirectly influence behavior through the mediating role of attitude; therefore, values directly influence attitudes. We sought to determine which values predicted consumers' attitude toward the use of gene-editing in food production by answering the research question: What effect do perceived benefit, perceived risk, subjective social norm, institutional trust, preference for naturalness, environmental concern, and food technology neophobia have on participants' attitudes toward using gene-editing in food production?

## Methods

The study was conducted as part of an undergraduate research methods course at Texas A&M University, although students were not involved in the survey instrument development process. The research team, including the lead instructor of the research methods course, developed the survey instrument using existing literature. The instrument, that was also used in a larger nationwide study, included a three-item scale measuring attitude toward the use of gene-editing in food production (Chen et al., 2013); a three-item scale measuring perceived benefit of gene-editing (Ferrari et al., 2021); a three-item scale measuring subjective social norm (Thyroff, 2011); a three-item scale measuring perceived risk of gene-editing (Pixley et al., 2022); a six-item scale measuring institutional trust (e.g., agriculture, food industry, science/research; Roosen et al., 2015); a four-item scale measuring food technology neophobia (Cox & Evans, 2008); a three-item scale measuring preference for naturalness (Bearth et al., 2014); and a four-item scale measuring environmental concern (Dunlap et al., 2000). Items in each scale were measured using 5-point, 6-point, or 7-point Likert-type response scales, and all scales were internally consistent with Cronbach's alpha coefficients ranging from .80 to .97. To collect data, students in the course posted the survey link to their social media accounts twice in two weeks and received  $N = 177$  usable responses. We analyzed the data using a simultaneous multiple linear regression analysis with attitude as the dependent variable.

## Results

Most respondents identified as white ( $n = 160$ ; 90.40%), females ( $n = 141$ ; 79.66%), between the ages of 18 and 44 ( $n = 109$ ; 61.58%), who lived in Texas ( $n = 148$ ; 83.62%). The regression model accounted for 84.02% of the variance in participants' attitudes toward the use of gene-editing in food production (see Table 1). Accounting for the number of predictors, the adjusted percentage of variance explained is 83.36%. The F-test shows that the model explained a statistically significant amount of variation in the dependent variable ( $F(7, 169) = 126.98, p < .001$ ). Holding all other variables constant, each additional point in perceived benefit is associated with a statistically significant average increase in attitude of .363 ( $t(169) = 5.67, p < .001$ ); each additional point in subjective social norm is associated with a statistically significant average increase in attitude of .262 ( $t(169) = 5.68, p < .001$ ); and each additional point in institutional trust is associated with a statistically significant average increase in attitude of .196 ( $t(169) = 2.83, p = .005$ ). Moreover, each additional point in perceived risk is associated with a statistically significant average decrease in attitude of .185 ( $t(169) = -2.80, p < .006$ ), and each additional point in food technology neophobia is associated with a statistically significant average decrease in attitude of .103 ( $t(169) = -2.06, p = .041$ ). Preference for naturalness did not significantly affect attitude, nor did environmental concern.

**Table 1**

*Results from the Regression Model with Attitude as the Dependent Variable*

Predictors	Attitude Toward Gene-Editing ( $\alpha = .97$ )			
	<i>B</i> (S.E.)	<i>t</i>	<i>p</i>	$\beta$
Intercept	2.019 (.521)	3.87	< .001	--
Perceived benefit ( $\alpha = .93$ )	.363 (.064)	5.67	< .001	.335
Subjective social norm ( $\alpha = .91$ )	.262 (.046)	5.68	< .001	.298
Perceived risk ( $\alpha = .83$ )	-.185 (.067)	-2.80	.006	-.143
Institutional trust ( $\alpha = .86$ )	.196 (.069)	2.83	.005	.124
Food technology neophobia ( $\alpha = .87$ )	-.103 (.050)	-2.06	.041	-.104
Preference for naturalness ( $\alpha = .81$ )	-.096 (.059)	-1.64	.104	-.062
Environmental concern ( $\alpha = .80$ )	.011 (.044)	.25	.802	.008

*Note.*  $R = 84.02\%$ ;  $R^2 = 83.36\%$ .

## Conclusions

Perceived benefit of gene-editing had the strongest positive effect on consumers' attitude, followed by subjective social norm, while perceived risk had the strongest negative effect on attitude, followed by food technology neophobia. To increase perceived benefit, food manufacturers should consider including voluntary labels on gene-edited food packaging that include information about the technology's benefits. To improve subjective social norm, visual communications about gene-editing should depict social environments. An effective strategy may be to use consumers as information sources so that consumers see others like them supporting gene-edited foods. In the future, scholars should control for socio-demographic characteristics when conducting similar regression analyses. They should also measure behavioral intention toward gene-edited foods and conduct mediation analyses to determine how attitude mediates the relationships between consumers' values and behavioral intention (Homer & Kahle, 1988).

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